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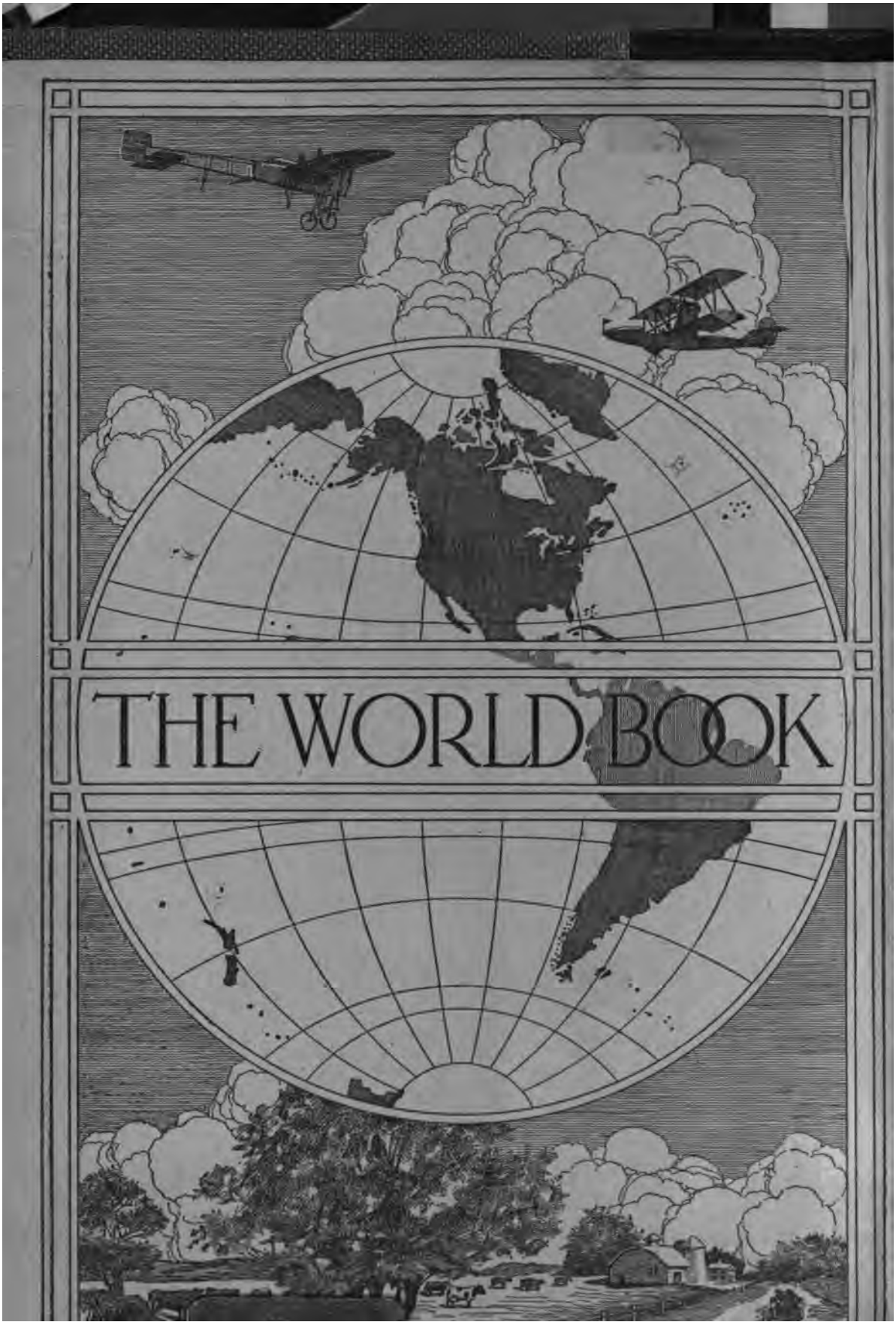
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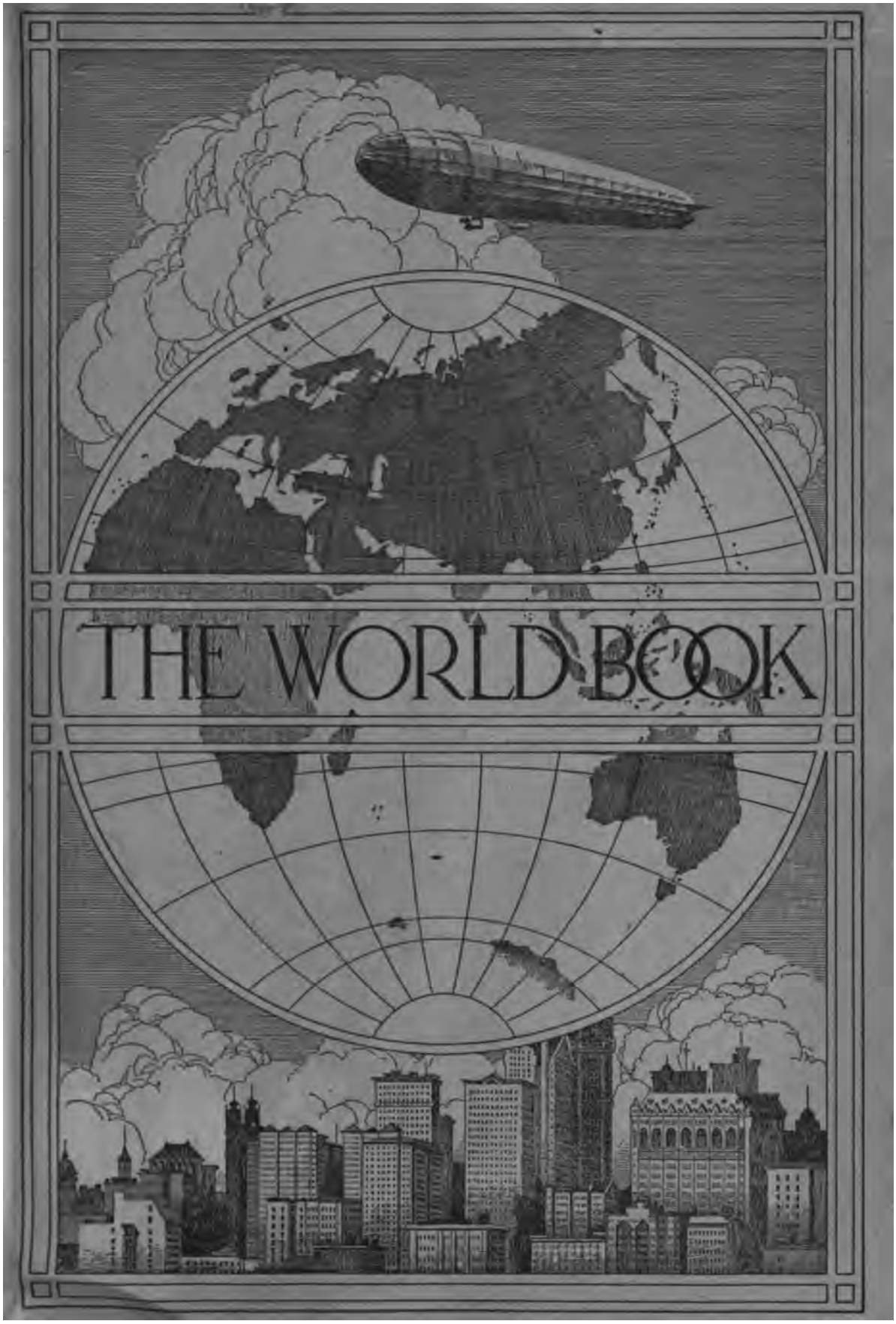
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VOLUME SEVEN

RICH'ARD, the Christian name of three English kings who ruled between 1189 and 1485.

Richard I (1157-1199), who reigned from 1189 to 1199, has come down in history as **RICHARD THE LION-HEARTED** (Richard Coeur de Lion). He was one of the five sons of Henry II, first king of the Plantagenet dynasty. Shortly after Richard ascended the throne he joined Philip Augustus of France in an expedition to the Holy Land. In 1192, while on his journey home, he was seized by Leopold, Duke of Austria, and confined in a castle on the Danube as a prisoner of Emperor Henry VI. There he remained until a heavy ransom was secured for his release. It is said that while he lay in prison his favorite minstrel sought him out and made himself known by singing to his master outside the castle. This romantic tale, given more fully in these volumes in the article **BLONDEL,** is one of the many associated with the adventurous king. He also appears prominently in Scott's *Talisman.* Richard returned to England in 1194, but did not take up the active administration of state affairs. Instead, he left the government to the care of a trusted minister and himself engaged in a war with Philip Augustus of France. In 1199 he was killed during the siege of a French castle, and was succeeded by his brother John. During his entire reign Richard spent less than one year in England. Though a brave and accomplished man, he performed not one service for the good of his country.

Richard II (1367-1400) was ten years old when he succeeded his grandfather, Edward III. Richard was the second son of the Black Prince, and the nephew of John of Gaunt. The latter became the real ruler, and so heavily did he tax the people that a rebellion under Wat Tyler broke out in 1381. In quelling this insurrection the boy king showed considerable spirit and courage. Wars and intrigues disturbed the rest of Richard's reign, and in 1399 he abdicated. The immediate cause of this event was his confiscation of the estates of his cousin, the Duke of Hereford, eldest son of John of Gaunt. Hereford raised an army against Richard and forced him to resign the crown, and it is supposed that he later had him put to death. During the reign of Richard, Chaucer wrote his *Canterbury Tales* (which see) and Wycliffe made a translation of the Bible. Important political movements were the development of the Privy Council and an increase in the activity of Parliament. The Duke of Hereford succeeded to the throne as Henry IV.

Richard III (1452-1485), the youngest son of Richard, Duke of York, succeeded to the throne in 1483. His reign was brief and troubled, for he represented one of the two rival houses—Lancaster and York—whose struggles for the crown made up the annals of the Wars of the Roses. When, in 1483, Edward IV died, his little son became king as Edward V. This child was left to the care of his uncle, Richard, Duke of Gloucester, who became Protector of the kingdom. Soon after this, Richard began plotting for the kingship. He had the most powerful relatives of the queen mother arrested and beheaded, the boy king and his young brother were placed in the Tower, and an ignoble Parliament declared the Protector the rightful king. A crown so gained could not be securely held, and the king was soon threatened by plots for the rescue of the imprisoned children. Richard probably tried to offset these plots by having the young princes murdered; at least the evidence points to his guilt in this cruel scheme. At all events the people looked upon him as the murderer of his nephews, and a general uprising in favor of the House of Lancaster quickly took form. On Bosworth Field, in 1485, Richard's forces were defeated by an army under the Earl of Richmond, who became king as Henry VII. Richard himself was slain in the battle. For a striking though exaggerated view of Richard's character the reader should study Shakespeare's great historical play, *King Richard III.*

Consult Archer's *Crusade of Richard I;* Vickers' *England in the Later Middle Ages;* Markham's *Richard III: His Life and Character.*

Related Subjects. The following articles in these volumes give added information on the periods covered by these reigns:

Blondel
Crusades, subhead *The Third Crusade*
Edward, the Black Prince
Plantagenet
Roses, Wars of the
Tyler, Wat

RICHARDSON, JOHN (1796-1852), a Canadian soldier and novelist, best known as the author of *Wacousta, or The Prophecy,* an exciting tale dealing with the siege of Detroit by the Indians under Pontiac. Richardson was born near Niagara Falls, Ont. During the War of 1812, though still a boy in his teens, he fought as a volunteer until his capture at the Battle of the Thames. After his release he joined the British army, and eventually rose to the rank of major. In 1835 he fought for the queen regent against the Carlists in Spain, but in 1838 returned to Canada as a special correspondent for the London *Times.* In 1840 he founded at Brockville a paper called *The New Era,* and later for two years edited the Kingston *Native Canadian.* The last years of his life were spent in the United States in newspaper work. In addition to *Wacousta* he wrote *Ecarté, or the Salons of Paris; The Canadian Brothers; War of 1812; Eight Years in Canada,* and *Tecumseh.*

RICHARDSON, SAMUEL (1689-1761), the first of the great English novelists. He was born in Derbyshire, where he received an elementary education. In his sixteenth year he went to London and became apprenticed to a printer, and after several years of service, in which he proved himself an industrious and careful worker, he went into business for himself. In this occupation he continued until 1739, when he was engaged by two booksellers to prepare a collection of letters which might serve as models for uninstructed people.

Richardson was a letter writer of some experience, for in his boyhood he had carried on correspondence for several Derbyshire young women. With a desire to make the proposed work interesting as well as useful, he represented several persons as exchanging letters which formed a complete narrative. Thus his first novel, *Pamela,* was written. Its popularity was great and immediate, and *Clarissa Harlowe,* his greatest work, published eight years later, met with an even more enthusiastic reception. Late in his life appeared *Sir Charles Grandison,* which dealt with fashionable life, as *Pamela* had dealt with the lowest and *Clarissa Harlowe* with the middle class. The fact that they were written in the form of letters made these novels of Richardson very long, and at times tiresome and overburdened with detail, but it gave the author an opportunity to show his wonderful power of portraying character. In the analysis of the finer shades of a woman's emotions and thoughts, he has never been surpassed.

RICHELIEU, *re sheh lyu',* or *reesh' e loo,* ARMAND JEAN DU PLESSIS, Duke de, Cardinal (1585-1642), a distinguished French statesman, for eighteen years practically the absolute ruler of France. He was born in Paris and prepared to enter the army, but later turned to the Church and in 1607 was consecrated Bishop of Lucon. In this office he proved zealous and able.

CARDINAL RICHELIEU
He used questionable means to gain his ends, which he believed to be for the good of his country. He developed France, but he also developed an absolutism in government which led eventually to autocracy's downfall.

However, he had political ambitions, and when in 1614 he was sent to the States-General as a representative of the clergy, he managed to win the favor of Maria de' Medici, mother of King Louis XIII, and through her to gain a position at court. In 1616 he was promoted to the secretaryship for war and foreign affairs, but in the following year, when the queen mother fell into disfavor, Richelieu, too, was banished from court.

Most Powerful Man in France. The reconciliation of the king and his mother was largely the work of Richelieu, who as a reward was raised to the rank of a cardinal. Recalled in 1624 to the royal council and made minister of state, he found himself the strongest man in France and a factor to be reckoned with in the affairs of Europe. France was disturbed at home by the political ambitions of the Huguenots and the lawlessness of the great nobles, and threatened abroad by the power of the Austrian House of Hapsburg; Richelieu's policy, adhered to throughout his life, sought, among other things, to remedy these conditions. He was not religiously intolerant and made no attempt to take away the freedom of worship

from the Huguenots, but he led in person the army in the siege of their stronghold, Rochelle, which submitted to him in 1628. The great nobles, too, were forced to surrender many of the powers which had for generations weakened the central government, and thus he made the king an absolute ruler.

His Influence in Europe. Richelieu's greatest achievements, however, were in foreign affairs, for he did much to restore to France the prestige which it had had in the days of Henry IV. Despite his attitude toward French Protestantism he threw his influence on the side of the Protestants in Germany, and induced Gustavus Adolphus to come forward as their champion in the Thirty Years' War. The full results of his policy for the humiliation of Spain and Austria he did not live to see.

Throughout all his years of power Richelieu had to contend against the personal dislike of the king, who retained him in office only because he dared not, for the sake of the country, dismiss him. Although sometimes unscrupulous in his methods, Richelieu always placed his country's good before his own, and in that sense proved himself a true patriot, though his policy did not in the end work to the greatest good of France. One of his most lasting services was the founding of the French Academy. A.MC C.

Consult Perkins' *Richelieu and the Growth of French Power.*

Related Subjects. The reader is referred to the following articles in these volumes:

Academy	Louis, subhead
France, subtitle *History*	*Louis XIII*
Huguenots	States-General

RICHELIEU RIVER, a Canadian stream, the outlet of Lake Champlain into the Saint Lawrence River. The Richelieu is also known as the Chambly, Saint John or Sorel River. Emerging from Lake Champlain, about six miles north of the United States boundary, the Richelieu flows almost directly northward for eighty miles to the Saint Lawrence, which it reaches at Sorel, midway between Montreal and Three Rivers. The Richelieu varies from a thousand to eight thousand feet in width. It flows through a picturesque section, which has added charm through its many historical associations. It is navigable from Sorel southward to Chambly; from there a canal to Saint John makes it possible to avoid the rapids. These three towns are the principal settlements on the river.

RICHMOND, *rich'mund,* IND., the county seat of Wayne County, situated on the Whitewater River, three miles from the Ohio state line and sixty-nine miles east of Indianapolis. Transportation is provided by the Pennsylvania, the Grand Rapids & Indiana and the Chesapeake & Ohio railroads, and by the Dayton & Western and the Ohio traction lines. The place was settled in 1816 by a community of Quakers from North Carolina. It was incorporated in 1834 and was chartered as a city in 1840. In 1910 the population was 22,324; it had increased to 24,697 in 1916 (Federal estimate). The city has an area of four square miles.

Richmond is the commercial center for the greater part of Wayne County, a rich agricultural district. There are about 130 manufacturing establishments, employing altogether about 5,500 men. Important manufactures include heavy machinery, office furniture, kitchen cabinets, lawn mowers and a variety of tools. Among noteworthy buildings in the city are the Federal building, erected in 1908 at a cost of $100,000, the $150,000 Reid Memorial Hospital and the $225,000 Reid Memorial Church. Richmond has Earlham College, established in 1847 under the direction of the Orthodox Friends, Morrison Reeves Library, with 30,000 volumes, and the Richmond Law Library. The Eastern Indiana Hospital for the Insane is located here, and there are homes for the friendless, the aged and the orphaned. Glen Miller Park (150 acres) is the largest of the park reservations, which cover about 300 acres. The annual convention of the Orthodox Friends of Indiana is held in the city.

RICHMOND, VA., the capital and largest city of the state, a port of entry and the county seat of Henrico County. It is one of the old, influential cities of the South, and played an important rôle in shaping and controlling the early destinies of the United States. During the War of Secession it was the capital of the Confederacy. It is situated south and east of the geographical center of the state, on the north and east banks of the James River, along a southward bend in the course of the stream, and at the head of tide water, ninety miles west of Chesapeake Bay. Washington, D. C., is 116 miles northeast. Steamer transportation to ports of the Atlantic coast is furnished by the Old Dominion, Virginia Navigation and Chesapeake lines, and railroad transportation by the Atlantic Coast Line, the Chesapeake & Ohio, the Richmond, Fredericksburg & Potomac, the Seaboard Air Line and the Southern roads. There was an increase in population from 127,629 to 156,687 (Federal estimate) be-

tween 1910 and 1916. The area of the city is over twenty square miles.

Situation and Parks. *Modern Rome,* as Richmond has been called, is a name suggested by the city's location upon hills (the original number was seven), which rise in terracelike formations from the river to an elevation of 250 feet above sea level. The higher points afford beautiful views of the river, with its many islands and bridges. The public parks contain 639 acres; Bryan Park, 263 acres, and William Byrd Park, 300 acres, are the largest. Gamble's Hill Park has an especially fine outlook; in the river below is Belle Isle, the site of the Old Dominion Iron and Nail Works, once used as a Federal prison; and from here also may be seen the famous Tredegar works, the principal iron foundry in the city, established during the War of Secession. In this factory cannon were made for the Confederacy. Libby Park extends from Main Street to the summit of Libby Hill, where stands a splendid monument to Confederate soldiers and sailors. Monroe, Jefferson and Marshall are smaller parks. Chimborazo, a park of thirty acres, was once the site of a Confederate hospital, and from here one of the city's finest roads extends five miles southeast to the National Cemetery, at Seven Pines.

Cemeteries. One of the city's favorite drives leads to Hollywood, where 18,000 Confederate soldiers lie buried, and here, erected to their memory, is a granite pyramid ninety feet high, partly covered by Virginia creeper and ivy. Here are the graves of some of Virginia's most illustrious dead, among them John Tyler, James Monroe, John Randolph, Jefferson Davis and many Confederate generals. In Oakwood, northeast of the city, are several thousand Confederate graves. Richmond has also Shockoe Hill (the oldest) and Riverview and Mount Calvary cemeteries. In the National Cemetery are 6,553 graves of Union soldiers who lost their lives in the struggles about Richmond. Of these graves, 5,700 are burial places of the unknown dead.

Public Buildings. Historic associations, even more than architectural merit, distinguish the prominent buildings of Richmond. In the heart of the city, on Shockoe Hill, stands the state capitol, surrounded by Capitol Square Park, twelve acres in extent. Thomas Jefferson, while minister to France, secured the model and plans for this building, which were designed from an ancient Roman temple, the Maison Carrée, at Nîmes. The structure was begun in 1785 and was four years in building. Some consistent remodeling, including the addition of east and west wings, was accomplished as the result of a state appropriation made in 1903. The original model is preserved. The building contains Houdon's marble statue of George Washington and a bust of Lafayette by the same sculptor. Saint John's Episcopal Church, built in 1740 and later enlarged, is still used for religious services. In the old churchyard which surrounds the building is the grave of George Wythe, one of those who signed the Declaration of Independence. In Saint John's Church, in 1775, at the Virginia Convention which met to hear the report of the first Continental Congress, Patrick Henry made his stirring speech including the famous words: "Is life so dear, or peace so sweet, as to be purchased at the price of chains and slavery?"

The oldest building in the city, known as the Stone House, was erected in 1737. It was first a dwelling, and is now used as a historic museum. The home of General Lee's family during the war, now occupied by the Virginia Historical Society; the home of Jefferson Davis while President of the Confederacy, and the old home of Chief Justice Marshall are among the city's treasures. On Broad Street stands Monumental Church, on the site of a large, wooden building in which the Constitution, framed at Philadelphia, was ratified by Virginia. In the Valentine Museum, the house in which Aaron Burr dwelt while on trial in Richmond for treason, is a fine collection of historic relics, paintings and statuary.

In Capitol Square are the executive mansion, the state library and the old Bell House. Facing the Square is the finest modern structure in Richmond, the city hall. It is built of granite and cost about $1,400,000. The Masonic Temple (built in 1785), the Chamber of Commerce, Sacred Heart Cathedral, Union Depot, the soldiers' home and the state penitentiary are other prominent buildings.

Monuments. Perhaps no American city has finer public monuments than Richmond. Two of the most noteworthy are equestrian statues of George Washington and Robert E. Lee. The first, designed by Thomas Crawford, stands in Capitol Square. The second, designed by the French sculptor Mercie, is in Lee Circle, and represents Lee on his favorite war horse, "Traveller." At the western limit of beautiful Monument Avenue is a fine Jefferson Davis monument, and at the eastern limit is the equestrian statue of General J. E. B. Stuart. The How-

itzer monument, and statues of Henry Clay, Stonewall Jackson and Hunter H. McGuire, a famous Virginia surgeon, are also noteworthy.

Institutions. Richmond is the seat of Richmond College, the Union Theological Seminary of Virginia (Presbyterian) and the Medical College of Virginia. Institutions for colored students are the Virginia Union University (Baptist), and, beyond the city limits, the Hartshorn Memorial College. The Mechanics Institute and private and normal schools supplement the public school system. Richmond has the state library, the Rosemary Library, a gift to the city from Thomas Nelson Page in honor of his wife, the state law library, public library and Virginia Historical Society Library. There are homes for aged and orphans, and among the principal hospitals are Saint Luke's, Grace, Memorial and the Stuart Circle.

Industry. Richmond is the leading industrial center in the state, with an annual output of goods valued at over $98,000,000. Abundant power for manufacture is created by cascades in the James River, by which the stream descends 100 feet in six miles. A canal around the cascades also furnishes water power. Richmond is one of the principal tobacco markets and manufacturing centers of the United States. The establishments engaged in this industry include stemmeries, packing houses, smoking and chewing tobacco factories, cigar and cigarette factories. Iron manufacturing is also extensive, and is represented by foundries and machine shops, locomotive works, car-axle and railroad-spike works and manufactories of farming implements, horseshoes and nails. Other manufactured products are fertilizers, flour, lumber and lumber products, paper, twine, baking powder, trunks and bats. The wholesale and jobbing interests of the city are important.

History. Captain John Smith, the leader of the Jamestown colony, bought from the Indians a tract of land near the present site of Richmond in 1609. He called the place "None Such." His attempt to colonize was not successful. Fort Charles was built near the falls in the river in 1645. Colonel William Byrd obtained grants of land in the vicinity in 1675 and 1687, and in 1733 his son, Colonel William Byrd, established the town of Richmond. It was incorporated by the assembly of Virginia in 1742, and in 1779 the state capital was removed from Williamsburg to Richmond. In 1782 a city charter was obtained. In 1861 the Act of Secession was adopted, and the city was the capital of the Confederacy from May, 1861, to April, 1865. Its capture was for years the chief aim of the North. From 1862 to 1865, when it surrendered, Richmond was almost continuously besieged; fifteen pitched battles and more than twenty skirmishes were fought in the attempt to capture it. Upon the eve of the evacuation, on April 2, 1865, General Ewell gave orders to the retreating army to fire the tobacco warehouses, arsenals and bridges.

Consult Powell's *Historic Towns of the Southern States.*

RICHTER, *riK'ter,* JOHANN PAUL FRIEDRICH, "Jean Paul" (1763-1825), the most famous German humorist and satirist, was born at Wunsiedel, Franconia. In early youth left penniless by the death of his father, he struggled desperately for an education, studied at Leipzig, and about 1782 attempted to enter the literary field. The following year his *Greenland Lawsuits* satirized several classes of society, but attracted little attention, and, rather discouraged, he spent the next three years in miscellaneous writing and aimless wandering. For a time he taught a private school, and, while depending on this for a living, wrote such clever satirical works as *Extracts from the Devil's Papers;* a romance, *The Invisible Lodge; Schoolmaster Wuz; Quintus Fixlein* and *Hesperus. The Invisible Lodge* gained wide notice, while *Hesperus* attracted to him the influential Charlotte von Kalb, who introduced him to Goethe and Schiller. In his last years, spent at Bayreuth, he turned his mind toward pedagogical problems and made valuable contributions to the subject through his *Levana* and *Introduction to Aesthetics.*

Richter was a brilliant, but unreliable, writer. A mere suggestion could open a multitude of ideas to him, but he scarcely completed any task. His satire, especially when dealing with political subjects, was bold and unrelenting. Doubtless his most valuable works for modern readers are his *Levana,* full of fruitful hints as to the education of women and young children, and his book on aesthetics, containing a keen analysis of wit and humor.

RICKETS, *rik'ets,* a disease of childhood of which the most important feature is softening of the bones. It is caused by lack of proper nourishment. The symptoms are sometimes noticed in children a few days old, but they develop most frequently between the ages of one and two. The bones, because of a deficiency of lime salts, undergo extraordinary changes. Enlargements appear at the ends of the ribs and at the elbows, wrists, knees and

ankles. The weak legs become bowed, the skull bulges out, the spine bends forward or sideways, and the child becomes "chicken-breasted." Soft spots in the head may fail to close for months beyond the natural time. The bones become so tender that even gentle handling of the child causes it pain, and at night it is restless and perspires profusely. Unless the disease is checked permanent deformities may result. As soon as the symptoms are noticed a child with rickets should be placed in the care of a physician. Dieting and attention to hygienic rules must be carefully observed. Proper nourishment, fresh air and clean and suitable clothing are the best aids to recovery. The standard medicine for cases of rickets is cod-liver oil, and in some instances physicians may prescribe phosphorus and other tonics.

RIDEAU, CANAL, *re doh'*, sometimes called the OTTAWA-RIDEAU CANAL, is a Canadian waterway extending from Kingston, on Lake Ontario, to Ottawa, on the Ottawa River. From Ottawa vessels can proceed down the Ottawa River to Montreal; thus the system provides a waterway between Montreal and Lake Ontario and avoids the rapids of the Saint Lawrence River (see map, page 1110). The distance between Montreal and Kingston by this route is 246 miles. When the Rideau Canal was begun, in 1826, this connection was of vital military importance, but the subsequent construction of railways destroyed its military value. It maintained its commercial importance, however, for years, and is still used extensively, although chiefly for local traffic.

The Rideau Canal was completed in 1832, and the first vessel passed through on May 29 of that year. It was built under the direction of Colonel John By, the British officer who founded Ottawa (which see, subhead *History*). The cost of construction was a little more than $4,000,000. The canal is 126 miles long, has a navigable depth of four and one-half feet, and includes forty-seven locks, each 134 feet long by thirty-three feet wide. A considerable portion of the Rideau system is canalized lake and river, beginning with the Cataraqui River at Kingston; farther north is Rideau Lake, from which the Rideau River flows into the Ottawa River at Ottawa.

Strictly considered, the Rideau Canal is the waterway from Ottawa to Kingston. The Ottawa Canals include three features, the Grenville and Carillon canals and the Saint Anne Lock, all on the Ottawa River and constructed to perfect the water connection between Ottawa and Montreal. The Saint Anne Lock cost $1,170,000; and the Grenville and Carillon canals, which are usually regarded as one canal, cost $4,000,000. The locks on this system are 200 feet long by forty-five feet wide. The traffic through the combined Ottawa-Rideau system is about 500,000 tons a year, of which one-half is the product of mines and more than one-third is lumber. Of the total traffic the Rideau Canal carries only 150,000 tons, the balance being between Montreal and Ottawa. There is practically no passenger traffic on the canals, although in recent years an increasing number of motor boats use certain parts of the waterway for short pleasure trips.

RIDGWAY, *rij'wa,* ROBERT (1850-), a leading American ornithologist, was born at Mount Carmel, Ill. From his boyhood he showed a remarkably intelligent interest in natural history, and when but seventeen years of age was zoölogist to the Clarence King geographical exploration of the fortieth parallel. In 1880 he became curator of the bird department in the National Museum at Washington, a post which he has retained ever since; and in 1883 he helped to found the American Ornithologists' Union, of which he later became president. He wrote *A Nomenclature of Colors for Naturalists,* a *Manual of North American Birds* and *The Birds of North and Middle America,* this last his chief work. It appeared in eight volumes, and ranks as one of the most important works on ornithology ever written, though very technical in form.

RIDING, *ride'ing,* when used in the sense of horsemanship, is a term which defines the art of keeping an easy and graceful seat on the back of a horse. Different peoples ride in different ways, and consequently have different standards of excellence; but it is generally admitted that the Cossacks of the Russian steppes, the wandering horsemen of Arabia and the cowboys of North America are among the world's most wonderful riders. The Cossacks and the cowboy are noted, in particular, for the ease with which they follow the rhythm of the horse's movements, so as almost to become a part of his body. Poise and constant practice are required for such riding.

The horse has naturally three paces—the walk, the trot and the canter, or gallop. A so-called "gaited" horse has been broken to still other paces, more comfortable for the rider, but the expert horseman adapts himself easily to any gait. He sits upright in the saddle,

gripping the leather firmly with his thighs. The leg below the knee hangs free and the boot-heel is usually equipped with a spur for use on the horse's flank. The feet, with the balls in the stirrup, should be held parallel with the sides of the mount, the heels a little depressed. The reins are held in one hand by a practiced rider, but the novice will do well to keep a rein in either hand until he has learned to guide his horse without taking much thought. In the walk and the canter, the art of riding consists in yielding to the horse's motion and falling in with the rhythm of his body; in the trot, the English habit of rising lightly in the saddle in time to the motion of the horse is now generally practiced.

Benefits. Horseback riding develops muscular control, courage and self-possession. It keeps one in the open air, and subjects the muscles to a light but constant exercise that is in the highest degree beneficial to health. Such finished athletes as the Greeks and the Romans of the ancient world were expert riders; the knights of the feudal period excelled in horsemanship. The present decay of horseback riding has deprived man of one of his most invigorating exercises.

RIDLEY, *rid'li,* NICHOLAS (about 1500-1555), an English churchman, one of the early martyrs to the reformed faith. He was graduated at Pembroke Hall, Cambridge, studied in Paris and at the University of Louvain, and after his return to England attracted the attention of Archbishop Cranmer, who made him one of his own chaplains and later chaplain to Henry VIII. He speedily became one of the leaders in the Protestant movement, and under Edward VI acquired great influence.

In 1547 he was created bishop of Rochester and in 1550 bishop of London; as a result of this promotion he was appointed to assist in revising the English prayer book and drawing up the Thirty-nine Articles. As an adherent of the Protestant side he favored the claims of Lady Jane Grey to the throne, and as a consequence found himself in a dangerous position on the accession of the Catholic Mary. In 1553 he was arrested, in the next year was brought to trial, and in 1555 was found guilty of heresy and burnt at the stake.

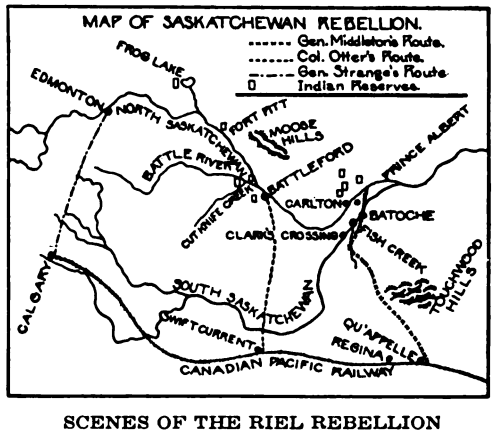
Related Subjects. Ridley's life will be more fully explained and the time in which he lived will be better understood by reference to the following articles in these volumes:

Boleyn, Anne	Reformation, The
Catharine of Aragon	Wolsey, Thomas
Cromwell, Thomas	Henry VIII

RID'PATH, JOHN CLARK (1841-1900), an American historian, born in Putnam County, Ind. He graduated from Asbury University, now De Pauw University, at Greencastle, Ind., was professor in Baker University, Baldwin City, Kan., for a time, and was then appointed to the chair of English in Asbury. He was later made vice-president of the institution, and it was chiefly through his efforts that the school secured an endowment of two million dollars and had its name changed to De Pauw University. He wrote a number of historical works which are somewhat popular in style but authoritative in content. His *Life of James A. Garfield* and *Life and Times of Gladstone* are worthy of mention, but his best-known production is the *History of the United States,* in eight volumes, which appeared the year of his death. It has had a phenomenal sale, due to the great popularity of the author.

RIEL, *reel* or *re'el,* LOUIS (1844-1885), a Canadian agitator, leader of two rebellions against the Dominion government. Riel voiced the protest of the half-breed and of all the great West against the entrance of civilization. Riel wanted to keep it as a frontier. A man of great personal magnetism, brilliant, eloquent, he is nevertheless a pathetic figure in Canadian history. He is usually called a half-breed, although in reality the Indian strain was once removed, for he was the son of a white man and a half-breed mother.

Riel was born at Saint Boniface, Man. He is said to have been educated for the priesthood at Quebec, but it is certain that he did not take orders. Between 1866 and 1868 he worked at various occupations in Minnesota, but he was not a conspicuous figure until 1869, when he led the Red River Rebellion (which



SCENES OF THE RIEL REBELLION

see). Riel was only secretary, and one John Bruce was president, of a council elected by the métis to insist on their rights, but Riel was the real head of the movement, and was later elected president of the "provisional government." When it was evident that the rebellion was a failure, Riel fled to the United States, where he remained for several years. In 1873 and again in 1874 he was elected to the House of Commons as member for Provencher. In the latter year, although there was a reward of $5,000 still standing for his capture, he actually attempted to take his seat. The Commons, however, expelled him, and in February, 1875, he was declared an outlaw.

For the next nine years Riel kept out of the public eye. In 1877 he was held for a time in an insane asylum in Quebec, but in the next year he was at large again, and there is some evidence that he was negotiating with the Fenians to lead an invasion of the Northwest. He then lived in Montana for five years, and from there was called by the French half-breeds, who had moved westward and were living on the Saskatchewan River, to help them win certain demands from the government. Here again, in March, 1885, Riel was elected president of the provisional government, whose headquarters were at Saint Laurent. The provisional government had a short existence (see Saskatchewan Rebellion), and Riel was captured and tried for high treason. His lawyers pleaded that he was insane, a plea which had numerous facts to sustain it; but Riel was nevertheless condemned to death, and was hanged on November 16, 1885. W.F.Z.

Consult Begg's *History of the Northwest;* Bryce's *Manitoba.*

RIENZI, *ri en'ze,* COLA DI (about 1313-1354), a tribune of the Roman people. He was born in Rome, and received an education which included much study of the history of Rome in the days of its splendor. This had a strong effect on him, and his desire to free the city from oppression at the hands of its aristocratic governors was intensified by his wish to avenge the death of his brother, who had been slain by a noble. The rulers of the city hated and feared him, but the Pope gave him his support, and by 1347 Rienzi was strong enough to call a meeting of the people on the Capitol and propose the adoption of a new form of government. New laws were drawn up and Rienzi was made tribune, with practically unlimited power, while the nobles left the city with no attempt at opposition.

At first he ruled justly, if sternly, and widespread approval of his acts was expressed; but his absurd ceremonials, together with his increasingly autocratic assumption of power, brought upon him ridicule and destroyed the confidence of the people in his disinterestedness, so that by the end of 1347 he was obliged to flee from Rome. For two years he lived in a monastery, and at the close of that time sought to induce Charles IV to take up the work of delivering Rome. Charles refused his request, put him in prison, and a year later gave him up to Pope Clement, who kept him imprisoned at Avignon. When Innocent VI became Pope in 1352 he released Rienzi and sent him on a mission to Rome. The people received him with enthusiasm and he was able within a few days to regain his lost power, but cruel and arbitrary acts on his part enraged the people and in October, 1354, a disturbance arose, during which he was killed. Bulwer-Lytton's *The Last of the Tribunes* deals with Rienzi's life, as does Wagner's *Rienzi.*

RIESENGEBIRGE, *re'zen geh bir'ge,* which means *giant mountains,* is a range forming the middle and highest part of the Sudetic mountain range in Europe, dividing Prussian Silesia and Lausitz from Bohemia. They are formed chiefly of granite, porphyry, mica schist and gneiss, and contain beds of coal, basalt and other minerals. The highest point is the Schneekoppe (Snow-Peak), which is 5,265 feet above the sea. The whole range is covered with giant pine trees and is ruggedly beautiful.

RIETSCHEL, *re'chel,* ERNST (1804-1861), a German sculptor who won enduring fame because of his ability to delineate character in portrait statues. He was born at Pulsnitz, Saxony, studied art at the Dresden Academy, and later became a pupil of Christian Rauch (which see). He was appointed professor at the Dresden Academy in 1832, after a trip to Italy, holding this post until his death. His statue of *King Frederick Augustus of Saxony* was finished when he was only twenty-seven years old. His best character portrayal is shown in the statues of *Lessing* at Brunswick, *Luther* at Worms, and the magnificent *Goethe-Schiller Monument* at Weimar. His execution of the figure of Weber at Dresden is superb because of its delicate simplicity. His deep religious feeling is manifested in the group, *Virgin and Dead Christ,* which was executed for the Friedenskirche (Church of Peace) at Potsdam. Of his statues of Luther and Lessing, which are considered his best productions, Lubke says:

"He has produced with imperishable power, in monumental form, the intellectual and moral ideals of the nation, in the persons of their noblest representatives."

RIFLE, *ri'f'l,* the principal weapon of all modern armies. It was invented in Germany in 1498, and was first used for military purposes in 1630. A rifle is practically a musket, with certain improvements, the chief of which is the "rifling," or spiral grooving in the interior of the barrel. This grooving gives a rotary motion to the bullet fired and lessens its tendency to depart from a straight line. The grooves, or corkscrewlike twists, vary considerably in different patterns, old rifles showing from a half or three-quarter turn to one complete turn in two to three feet of barrel length. The introduction of rifled barrels and modern ammunition has increased the effective range of rifles from about 200 or 300 yards to considerably over a mile.

The value of rifles was demonstrated in the Revolutionary War in America more than in any previous conflicts, and from that time the rifled barrel has been regarded as essential. In 1851 appeared the first rifle firing an elongated bullet instead of a round metal ball. It was called the *Minie,* after its inventor of that name, who was awarded $100,000 for his invention by the French government. The Minie rifle, weighing, with a bayonet attached, 10 lbs. 8¾ oz., was used in the Crimean War (1854). It fired a charge of 2½ drams of powder and was sighted from 100 to 1,000 yards.

Between 1857 and 1861 Sharp's, Green's, Westly Richards' and Terry's breech-loading guns were introduced. In these rifles the breech was closed by a block which contained a striker, or piston; when the striker was released by a spring it struck the cartridge and exploded the charge by percussion. Sharp and Spencer carbines and rifles were used by the Federal troops in the War of Secession, but the universal adoption of the breech loading dates from 1867.

Breech loading, combined with rifling, had greatly added to the efficiency of armies, but still further improvements were sought to insure quicker firing. This led to the introduction of the magazine principle. The Winchester was one of the earliest magazine rifles, and was used with great effect in the Russian-Turkish War of 1877. In the Winchester rifle the cartridges were loaded into a tube under the barrel and were forced into the chamber by the action of a lever.

Germany was the first world power to arm all its troops with a magazine rifle, converting the older pattern rifle then used, the 1871 Mauser, into a magazine rifle by addition of a tube beneath the barrel, as in the Winchester. The tube magazine was suspended by the box magazine behind and below the chamber. In these magazines the cartridges are forced in and out of the chamber by the bolt which opens and closes the breech. This principle is embodied in the rifles used by all modern armies.

The United States army up to 1904 was armed with the Krag-Jorgensen, which was then superseded by the Springfield rifle. The Springfield rifle barrel has four grooves and a caliber of 0.30; the rifling in the barrel makes one turn in eight inches of barrel length. A charge of 44.5 grains of smokeless powder is fired. The bullet is steel-jacketed, covering a core of lead, and weighs 44.5 grains. Wounds inflicted by modern bullets are more easily healed than were those caused by the bullets of former weapons. The rifling of the barrel and the high velocity of the projectile give the bullet a steady course and it leaves merely a small hole which if no vital organs are touched causes only temporary disablement. These bullets are effective at ranges up to 4,000 yards, but accurate shooting cannot be obtained at that range. At a distance of 1,500 yards a modern bullet will penetrate six human bodies, one behind another. So-called mushroom, or "dumdum," bullets have slight penetrating power. They expand on striking and often remain in the body struck.

The rifles used by European armies differ only in details of weight and length from the Springfield rifle, the principles of action, loading and firing being practically the same. The Springfield magazine is below the breech mechanism, and is loaded with five cartridges from a metal clip. Between the magazine and the breech is a "cut off," or piece of metal which closes the magazine and allows the rifle to be used as a single-firer, loaded by hand at the breech. This makes it possible to keep a full magazine ready for immediate use when quick fire is essential.

The Lee Enfield and Lee Metford, used by the British army, have magazines holding ten cartridges, the Mauser and Mannlicher of continental armies are loaded with a clip of five cartridges. The Mauser rifle is not provided with a cut off between the magazine and the breech, but has a safety which prevents accidental discharge; it is considered the simplest

in mechanism of all magazine rifles and is effective at long ranges. The Boers of South Africa used the Mauser in the war of 1899-1902 with great effect, and the Mauser now used by the German army differs only in minor details from the pattern then used. F.ST.A.

Consult Ommundsen and Robinson's *Rifles and Ammunition;* Askins' *Rifles and Rifle Shooting.*

Related Subjects. The reader is referred to list of articles in these volumes at end of article ARMY, page 385.

RIGA, *re'gah,* second only to Petrograd among the Russian seaports along the Baltic, is the capital of the government (province) of Livonia. It lies on the Düna River, about ten miles above the point where that stream empties into the Gulf of Riga (see colored map of Europe, following page 2092). The river has been canalized from the city to the sea, and is navigable that distance for small boats; large ocean steamers dock at the outer port of Ust-Dvinsk, at the mouth of the river. The chief disadvantage with which shipping must contend is the fact that the harbor freezes over about 127 days every year. Riga has excellent railroad communication with Southern Russia; water communication with the regions along the Dnieper and the Volga is afforded by a system of canals. Cereals, hides, skins and lumber are included among the exports, and foodstuffs, coal and manufactured goods make up the imports. The city has a large number of manufacturing plants, the yearly output of which approximates $30,000,000.

Founded in 1201, Riga early attracted many German settlers because of liberal regulations in regard to trade. It still has a large German population, and the old portion of the city looks much like a typical German town of the Middle Ages. In the suburbs, where the residential districts are found, the houses are modern. Among numerous educational institutions are a polytechnical institute, a navigation school, a library with about 100,000 volumes, and a city museum. Because it is the key to the occupation of Petrograd, Riga has suffered bombardment and siege in various wars; it was shelled by the Germans during the War of the Nations in 1915, and was captured by German troops, without resistance, in September, 1917. See WAR OF THE NATIONS. Population in 1913, estimated, 334,500.

RIGA, or LIVONIA, GULF OF, an inlet of the Baltic Sea, about 100 miles long and seventy miles wide (see colored map of Europe, facing page 2097). The gulf never entirely freezes over, and along the coast the waters are navigable for nine months of the year. The Düna, on which the city of Riga (see above) is situated, is the largest river opening into the gulf.

RIGGS, KATE DOUGLAS WIGGIN (1859-), an American novelist and writer of juvenile fiction, was born at Philadelphia, Pa. She was educated at Abbot Academy, Andover, Mass., and at the age of eighteen went to Los Angeles, Cal., to teach. In 1878 she founded at San Francisco the first free kindergarten on the Pacific coast and two years later established in that city the California Kindergarten Training School. It was while engaged in this work that she began her highly successful writing of stories for children. Her first book, *The Birds' Christmas Carol,* appeared in 1888, and seems to have increased in popularity year by year. Among her other stories for young readers should be mentioned *The Story of Patsy, Marm Lisa* and *Timothy's Quest,* a book that made a very strong appeal to children. All these books were written for children, but in 1902 she began to tell mature readers about children, in such delightful stories as *The Diary of a Goose Girl, Rebecca of Sunnybrook Farm, Rose o' the River* and *New Chronicles of Rebecca.* Mrs. Riggs has homes in New York and in Maine.

Few authors have understood child life more accurately than Mrs. Riggs or have written about it with more sympathy and enthusiasm. She has therefore made notable contributions to juvenile education and literature in America. Her books have the rare quality of not "talking down" to children, but instead they meet the juvenile mind on its own level. The result is a form of literature that really leaves a definite impression upon the child reader. It was her original idea that teachers should be trained for kindergarten work.

RIGHT OF WAY. See EASEMENT.

RIIS, *rees,* JACOB AUGUST (1849-1914), an American journalist, author and social worker, who was once called "America's most useful citizen," was born at Ribe, Denmark. At the age of twenty-one, after studying at the Ribe Latin School, he emigrated to America, and for six years was glad to get various employments, such as construction camp work, carpentry, coal mining, farm work and peddling. In 1877, after suffering from actual poverty, he became reporter for the New York *Tribune,* and later police reporter for the *Sun,* and in this capacity grew thoroughly familiar with conditions in the city's poorer section. His endeavors to effect various reforms in the tenement houses and

schools were successful, and he became prominent in the movements for securing greater purity in the city water supply, parks in the congested districts of lower New York, and well-equipped playgrounds for the poor children.

Riis's friendship and sympathy were particularly extended towards the immigrants of the lower classes. He was executive officer of the Good Government clubs, and became secretary of the New York Small Parks Commission in 1897. After serving as reporter for twenty-seven years on various New York papers, he resigned and devoted his time to lecturing and writing. At the time of his death on May 26, 1914, at his summer home in Barre, Mass., he was generally recognized as among the foremost social workers of America. Among his writings are his famous *How the Other Half Lives,* a book for which he was at first unable to find a publisher; also *The Children of the Poor; The Making of an American* (his autobiography); *The Battle with the Slum; Children of the Tenements; Theodore Roosevelt, the Citizen; The Old Town* and *Hero Tales of the Far North.*

RILEY, *ri'li,* JAMES WHITCOMB (1853-1916), an American poet who is known to countless readers as the exponent of the common things of life. He was born in Greenfield, Ind., October 7, 1853. His father's profession, the law, did not appeal to him, and after receiving a common school education he worked for a time as a sign painter and then became a traveling actor. His spare hours he spent in composing songs and revising plays for the show company, and he gained an intimate knowledge of the country folk of Indiana, their dialect and their peculiarities, of which he later made good use. Becoming, in 1873, a reporter for the Indianapolis *Journal,* he began to contribute poems to that paper and others, signing them "Benjamin F. Johnson, of Boone." His dialect verses soon became very popular, and the "Hoosier Poet," as he was called, won a wide reputation. In 1877, by a clever literary hoax, he deceived editors and readers all over the country. He published in the Kokomo *Dispatch* a poem called *Leonainie,* which he signed "E. A. P.," and which a statement of the editor's declared to be a newly discovered poem by Poe. Even critics were interested, and not until the *Dispatch* itself explained the joke was the deception known.

For a time, with Edgar W. (Bill) Nye, Riley traveled about the country lecturing and reading from his poems, and his wonderful power of mimicry made him very successful in this. His first collection, *The Old Swimmin' Hole and 'Leven More Poems,* was followed by *Old-Fashioned Roses, Neighborly Poems, Rhymes of Childhood, An Old Sweetheart of Mine, Out to Old Aunt Mary's* and *A Child World.* The pathos and humor of these simple poems of

JAMES WHITCOMB RILEY
The best loved and most widely read poet of his generation.

Indiana life have made their appeal very general, and few poets of the present day have been so widely read. An intimate knowledge of child life, too, is shown in much of his work. Not everything which he has done has been in the Indiana dialect; he has written some beautiful selections in pure English.

In 1913, on his sixtieth birthday, a unique celebration was held in his home on Lockerbie Street, Indianapolis. Thousands of school children paraded before him, some of them carrying flowers, and the most prominent men of his state, as well as many of the poorer classes, visited him and did homage to his genius and his understanding love for nature and for humanity.

RIMOUSKI, *ree moos'kee,* the county town of Rimouski County, Quebec. It is on the south bank of the Saint Lawrence River, and on the Intercolonial Railway, 180 miles northeast of Quebec and 342 miles northeast of Montreal. It is the last port of call for outgoing transatlantic steamers on the Saint Lawrence.

Rimouski is the seat of a Roman Catholic bishop, and has a cathedral, seminary, monastery, three convents, a normal school and a commercial school. Being the county seat, it has the county courthouse and jail, and it also has customs and quarantine offices. Among its chief industrial establishments are saw and pulp mills, a sash-and-door factory and a flour mill. Lumbering, mixed farming and fishing are the resources of the neighborhood. Population in 1911, 3,097; in 1916, about 3,500.

RIN'DERPEST, or **CATTLE PLAGUE,** an acute, infectious disease which attacks cattle and occasionally sheep. In Europe it has been a most serious plague since its appearance in the fourth century, but it is unknown in North America. Epidemics of rinderpest have swept from country to country in Europe, causing enormous losses. About ninety per cent of the animals attacked die, but if an animal survives, it is thenceforth immune. The source of infection is believed to be a minute organism or microbe (see BACTERIA AND BACTERIOLOGY), which may be carried in the manure or by sick animals or on the clothing of attendants. The disease shows itself by a high temperature and a rapid pulse. The milk supply stops. The next stage is marked by congestion of the mucous membranes of the mouth, throat, etc., and by the appearance of ulcers. Death is likely to ensue within four to seven days. No certain cure has as yet been discovered, but epidemics are held in check by inoculating healthy animals with a prepared serum. It is sometimes necessary, in order to wipe out the disease, to kill all infected and exposed animals.

RINE'HART, MARY ROBERTS (1876-), an American story-writer whose works are widely read for their humor and interesting plots. Her early novels were mystery stories, among them being *The Window at the White Cat, The Man in Lower Ten* and *The Circular Staircase.* Her later works, though still pervaded by an element of mystery, more nearly approach the character novel in type. Her novel, *When a Man Marries,* was unsuccessfully dramatized in the play called *Seven Days.* The popular magazines contain many of her short stories and articles of travel.

MARY ROBERTS RINEHART

Mrs. Rinehart was born in Pittsburgh, Pa. She was educated in the grade and high schools of that city, and at the training school for nurses. In 1896 she was married to Dr. Stanley Marshall Rinehart, and they later made their home at Glen Osborne, Sewickley, Pa. Mrs. Rinehart has taken an active part in the suffragist movement, and during the War of the Nations she enlisted in the American Red Cross, serving for a year in France and Belgium.

Well-known works not mentioned above are *Where There's a Will, The Amazing Adventures of Letitia Carberry, The Street of Seven Stars, "K," Kings, Queens and Pawns* (impressions of the war in Europe) and *The Altar of Freedom.* The last named, published in 1917, is a message to American mothers.

RING, a band of gold or other precious metal, usually worn on the finger. The earliest known are those found in the tombs of ancient Egypt, though it is certain that the wearing of rings is as old as human history. The custom grew out of a love of ornamentation, but gradually took on a more significant aspect. Kings passed their rings to trusted servants, that they might have the full authority of the king himself. The signet ring with some distinctive device took the place of the purely ornamental ring. Pharaoh placed his signet ring on Joseph's finger when he set him over all Egypt, that all men might know that he held full kingly power (*Genesis* XLI, 42). The use of betrothal or engagement and wedding rings originated with the Jews. The wedding ring is worn on the third finger of the left hand because it was once popularly but erroneously supposed that a vein runs directly from that finger to the heart, and heart and hand are offered together.

In addition to an ornament, a ring has always been regarded as a symbol of authority, confidence and love, and still plays an important part in the coronation of kings and in the consecration of bishops. Among uncivilized people, such as many tribes in Africa and the islands of the Southern Ocean, rings still adorn noses, ears, arms, ankles and toes, but civilized nations encourage the wearing of rings only on the fingers and in the ears, though earrings are unfashionable at times. As an ornament to rings the diamond maintains the first place, though many other precious stones, such as the amethyst, turquoise, topaz, pearl and sapphire,

are extensively worn. Until the fourteenth century thumb rings were commonly worn, and Falstaff boasted that although he was enormously fat, he could in his youth "creep into an alderman's thumb ring." Modern rings are

OLD FORMS OF RINGS

(1) Ancient Egyptian ring
(2) Gold ring from Mycenae
(3) Egyptian signet ring
(4) Roman gilded bronze ring
(5) Grecian gold ring
(6) Gold signet of a Brahman
(7) Anglo-Saxon betrothal ring
(8) Jewish marriage ring
(9) Papal ring, fifteenth century
(10) Betrothal ring, seventeenth century
(11) Wedding rings of Luther and Katharina
(12) Merovingian ring

chiefly made in London and Birmingham, England; and in Paris, Vienna and New York, and are sold at prices ranging from a few dollars up to thousands of dollars each, according to the stones with which they are set.

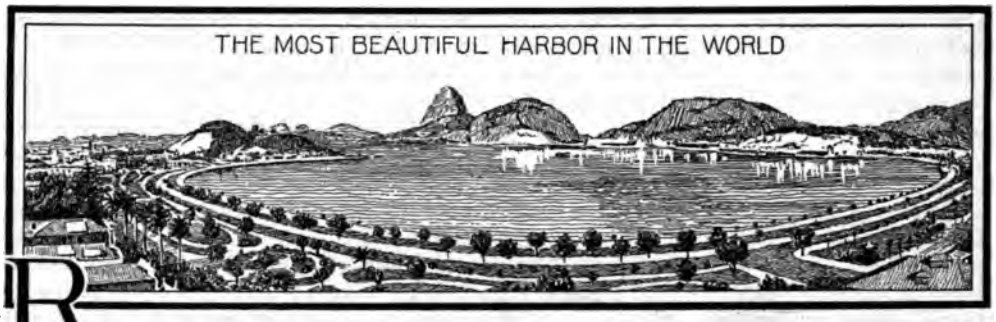
The ring of the Pope is of especial interest. It is presented to him at his coronation by the city of Rome, and bears his name and a picture of Saint Peter in a boat. Every official decree of the Pope must be signed with this signet. When the Pope dies his ring is broken, and a new one is prepared for his successor. The Papal ring shown above is not the type worn by the Pope, but is an example of the huge thumb rings given by the Popes to newly-appointed cardinals.

Consult Edwards' *History and Poetry of Finger Rings.*

RING AND THE BOOK, The, a remarkable poem by Robert Browning, the greatest achievement of his genius. It was suggested by an old book which he picked up on a stall in Florence, and tells the story of the marriage, unhappy life, and death of Pompilia, one of the loveliest heroines in all literature. She was married to Count Guido Franceschini, who chose her only because he thought she was wealthy; and when he discovered that she was but a poor girl he murdered her and her parents. The unique feature is the method presentation; each person concerned tells the tale from his own point of view, and the same story is thus repeated over and over, yet without loss of interest.

RINGWORM, *ring'wurm,* so called because it spreads in rings, is a skin disease caused by a minute vegetable mold, or fungus. The affected spots become inflamed and covered with scales, and the victim suffers from constant itching. A very common form of ringworm attacks the scalp, causing the hair to break off, loosen and fall out. Temporary bald spots appear in affected areas. Ringworm of the beard is another prevalent form (see Barber, subhead *Barbers Itch*). A third variety, called body ringworm, appears most often on the face, neck and arms. To check those forms which attack hairy parts of the body physicians apply ointments or medicines which kill the parasite. These include sulphur ointment, mercurial ointments, and preparations of iodine, carbolic acid and caustic potash. Before these can be applied affected areas must be shaved and roots of diseased hairs be pulled out. Scales and scabs are loosened by hot water or oil applications.

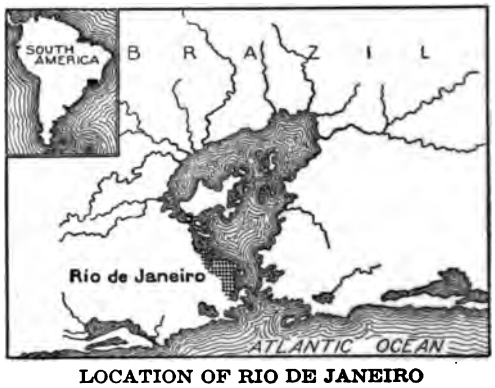
All cases should have the constant attention of a reliable physician, as diseased areas are made inflamed and sore if the treatment is continued too long, and the eruption breaks out anew if treatment is discontinued before the fungus is killed. The X-ray has also been found helpful. Body ringworm generally yields readily to treatment with ointment, the chief source of danger being the patient's tendency to spread the disease by scratching the spots. As all forms are extremely contagious, utmost care must be taken to have the victim use his own comb, towels, wash cloths and other personal articles.



RIO DE JANEIRO, *re'o da zha na'ro*, capital of Brazil and the second largest city of South America. Buenos Aires, the capital of the Argentine Republic, is the first city of the world south of the equator, and Rio, as it is familiarly called, with a population of 1,128,637 (estimate for 1913), comes next. Rio de Janeiro is 5,204 miles from London, 4,748 miles from New York and 5,160 miles from New Orleans. It is situated on the west side of the Bay of Rio de Janeiro, which, stretching inland for several miles and studded with islands and surrounded by mountains, is accounted the most magnificent harbor in the world. The city owes much of its beauty to the fact that it is built on the flat land and low, wooded hills between the mountains, the spurs of which project in some places almost to the margin of the bay and form picturesque valleys within the city limits. The residence quarters of the city follow some of these valleys up the sides of the mountains, and in other places the poorer residents have built their huts on the steep slopes.

Until the latter part of the nineteenth century Rio de Janeiro was a typical Latin-American city, a picturesque Old World sort of place which had its daily paper, founded in 1808, its National Museum and its botanical gardens, and enjoyed an enormous export trade in coffee. Then it was a city with narrow streets, poorly-built wharves and a harbor that was filling up with silt so that no large ships were able to dock. To-day, while retaining all of its beauty and charm, it is an almost perfect example of the ideal modern city, with beautiful public buildings and private residences, clean, asphalt streets, palm-bordered boulevards, good sanitation and pure water. One of the interesting features of this new city is a boulevard which has been laid out along the shore of the bay for a score of miles, at an expense of $17,000,000. This is bordered with trees, and its wider parts are filled in with gardens.

The Mangue Canal, a waterway originally built for connecting the bay with a great city market, has been enclosed with stone walls and bordered with great, royal palm trees, and is now part of a public pleasure ground. The most famous street of the city is the Rua do Ouvidor, a promenade lined with shops, cafes and newspaper offices. There are many public parks and gardens, for, as in most Portuguese cities, the principal buildings are grouped around squares. The most famous of the parks is the Botanical Garden, founded in 1808, noted for its rare plants from all over the world and for its avenue of royal palm trees. These trees



LOCATION OF RIO DE JANEIRO
The square black spot in the corner map shows the area included in the larger map.

are not native to Brazil, but were imported originally from the West Indies. In the Botanical Garden may be seen the original "mother" palm, the first to be imported, with a bronze tablet on the trunk to commemorate the event.

Many of the public buildings, both the old and the new, are magnificent. One of the most notable is the National Museum, once the residence of the Emperor Dom Pedro II. It now contains the most valuable collection of books in South America, and has its own printing and bookbinding shops. Others include the palace of justice, one of the finest buildings in the city

and the headquarters of the ministry of public industry and public works; the Cattete Palace, the official residence of the President of the republic; the Itamaráty Palace, which is now occupied by the Ministry of Foreign Affairs; and the Municipal Theater, which ranks with the greatest theaters of Europe. Another interesting feature of the city is the aerial trolley which connects Sugar Loaf, a mountain peak at the entrance of the bay, with the main part of the city. In marked contrast to this triumph of twentieth-century engineering construction is the primitive public fountain, a long pipe with twenty or thirty taps, where the poor of the city may get free water. The Roman Catholic religion is the faith of the majority of the inhabitants. The city has several professional and secondary schools, but elementary education is somewhat neglected.

About the year 1900 Rio de Janeiro began to realize that its position as the shipping port for the richest, most productive and most thickly-settled region of Brazil depended on extensive harbor improvements. These have been completed at a cost of millions of dollars. The entrance to the harbor is open to the largest vessels, and inside there is room for all the navies of the world. The water front is lined with walls of solid masonry. Deep-water quays, which are great piers of concrete and stone, have been built, beside which the largest boats can anchor. Both hydraulic and electric power are available for loading and unloading the trams, and railways connect the quays with the shipping and warehouse districts. Besides the enormous coffee output, the city's exports include sugar and tapioca, tobacco and cigars, meat and hides from the great cattle plains of the south and west, and cabinet woods from the forests.

In 1916 it was announced that, following the successful example of the neighboring city of Nictheroy, Rio de Janeiro would adopt the single tax, thus becoming the largest city in the world to have approved the Henry George theories. See BRAZIL.

Consult Bell's *The Beautiful Rio de Janeiro;* the Pan-American Union's *Municipal Organizations in South America.*

RIO GRANDE, *re'o grahn'da,* a river which forms about half of the international boundary line between the United States and Mexico. Rising in the Rockies of Southwestern Colorado, it flows south through New Mexico, then follows a southeasterly course between Texas and Mexico, emptying into the Gulf of Mexico near the town of Brownsville, Tex. It has a total length of 2,000 miles, but is of little value for navigation. In its upper reaches there are numerous gorges and cataracts, and for miles along its middle course it flows through an arid country. Large quantities of its waters are used for irrigation purposes by the people of New Mexico, so that its bed becomes a dry valley in some sections during the hot weather. Small boats navigate the river for 250 miles from the mouth. The region along the Rio Grande was the scene of many of the border disturbances that caused the invasion of Mexico by United States troops in 1916. See MEXICO, subtitle *Government and History.*

Consult Stevens' *The Valley of the Rio Grande.*

RÍO NEGRO, *re'o na'gro,* the main stream of a river system flowing through the equatorial forest region of South America. By some geographers the Guainia, rising in Southeastern Colombia, is considered the headstream; others consider the headstream to be the Uaupés, which rises in the Andes in Western Colombia. The former flows in a northeasterly direction to the boundary of Venezuela, then turns to the southeast and makes its way into Brazil, where the Uaupés joins it. From this point the river flows in a general southeasterly direction, emptying into the Amazon through an estuary fifty miles above the Madeira River. Including the Uaupés, the Rio Negro is 1,400 miles in length. Long stretches of the upper river are navigable, but the stream is of little value commercially because it flows through a wild and unsettled country. The thriving trading city of Manaos is located on its banks ten miles above its mouth, and the Rio Negro from this point to the Amazon is an important trade route for ocean vessels.

RIOT, *ri'ut.* In criminal law a riot is an offense against the public peace by three or more persons who have banded themselves together without authority, with the intent and purpose of assisting one another in threatening violence or in violently opposing an individual or a corporation that has worked a real or supposed injury to those engaged in the riot. A riot is characterized by such disturbance as to jeopardize public safety or to cause public terror. At least three people must engage in the offense to have it recognized as a riot. A similar offense committed by less than three people is an *affray.*

The statutes of different states and provinces fix the penalty of those convicted of engaging

in a riot. If rioting results in loss of life the penalty is more severe than when it results in destruction of property alone. If the riot is against the government those engaged in it may be convicted of treason.

Riot Act. The Riot Act was an act passed by the British Parliament during the reign of George I. It was commanded to be read aloud by a justice of the peace or any other authorized officer of the law, whenever people assembled themselves for the purpose of creating a disturbance or committing any other unlawful act. It commanded the people to disperse in the name of the sovereign. In America "to read the riot act" has come to be a slang expression for uttering a severe reprimand.

RIPARIAN, *ri pa'ri an,* **RIGHTS.** The owner of land bordering on a stream that is not navigable owns that portion of the bed of the stream which adjoins his land, as far as the central line or middle of the stream. He is also entitled to his share of the water for such uses as will not impair its availability for any purpose farther down the stream. He is not entitled to all the water, neither can he make such use of the stream as will pollute the water, nor turn it into another channel, if by so doing he will prevent those farther down the stream from the natural benefits they would receive from it. These rights are known in law as *riparian rights,* and the owner is known as a *riparian proprietor.* The term is derived from the Latin *ripa,* meaning *river bank.* The remedy for violation of riparian rights is usually through injunction (which see).

RIP VAN WINKLE, *wink''l,* a famous story by Washington Irving, published in 1819, in the *Sketch Book.* Rip, the title character, is a lazy, good-natured, intemperate ne'er-do-well, who on one of his hunting trips meets with Henry Hudson and his crew in the forests of the Catskills. He drinks of the liquor with which he is made to serve his companions, and as a result falls into a sleep from which he does not waken for twenty years. Returning then to his home he finds that his scolding wife has died, as have most of his old friends, his daughter has married, and his country, which when he fell asleep was a colony of England, has become a republic. The story was dramatized several times before Boucicault, in 1866, produced the more effective version which Joseph Jefferson made famous.

RISTORI, *rees toh're,* ADELAIDE (1822-1906), an Italian actress, was born at Cividale. Her parents were strolling players, and she herself began while a child to take part in their crude plays. At the age of fourteen she gained a position with a reputable company and won fame as Francesca da Rimini in the tragedy of that name. Her next great success came when she was eighteen years old in her acting of Schiller's *Mary Stuart.* Her beauty and talent had by this time attracted many ardent admirers, and one of these, the Marquis del Grillo, she married in 1847.

Each year she added to her stage triumphs until, in 1855, she was called to Paris, where she surpassed all her former efforts. Seldom if ever had there been a similar sensation in the theatrical world. The great Rachel, whose equal as an actress many French critics had declared could never exist, was playing in the city at the same time, and crowds argued over their respective merits with such anger that many persons came to blows. In 1857 Ristori played in Spanish at Madrid and audiences shouted their admiration. She visited America four times between 1866 and 1885, and retired from the stage in 1888 with the declaration of Italian critics that she was the greatest actress Italy had ever produced.

RIV'ER. All the facts associated with the formation of a river and the uniting of streams into a river system may be observed in a roadway after a shower. The drops of water collect into little rills which unite with others to form larger rills, and a number of these unite and form a main stream which carries the water down the embankment. Each tiny stream wears its channel in the soft earth, and the raindrops that flow in one are separated from those flowing in another by a little ridge or a gentle slope whose crest forms a watershed in the miniature landscape. However large a river may be, it has been formed in a manner similar to that of the little stream flowing down the embankment. The only difference is that in case of the river we deal with larger facts.

A river unsually has its beginning far up in the mountains or hills, with a little spring or a melting glacier for its source. As it flows on, other streams join it and it continues to increase in volume. The river wears for itself a channel which is lower than the surrounding country. The bottom of the channel is known as the *bed* of the stream, and the sides are the *banks.* The *right* bank of a river is that on the right hand of the observer when he is facing downstream. A river and all its tributaries constitute a *river system.* The area drained by a river system is known as the river *basin.*

The basin of the Mississippi River, for instance, includes that portion of the United States drained by that river and its tributaries. The volume of a river depends upon the area of its basin and the amount of rainfall. Heights of land which separate rivers and river systems are known as *divides*.

The Work of Rivers. The course of a river is divided into three parts—the upper, the middle and the lower course. These parts are seldom of equal length, and each is marked by distinctive characteristics. In the upper course the slope of the channel is steep and the current swift. The channel has been worn down rapidly and the banks have a steep slope, sometimes being nearly perpendicular. The water carries quantities of sand and gravel and sometimes rocks of considerable weight, which are borne swiftly along by the current, constantly wearing away the bed of the stream. The swiftness of the current enables it to remove most of the obstacles in its course, and the channel is free from small curves. The channels of the tributaries are usually worn down to the level of the main channel, forming ravines.

The river enters upon its middle course when it leaves the mountainous or hilly region in which it rises, and enters the lower lands where the slope is more gentle. The current is not swift enough to carry the heavy material that it has brought down to this point, and this is deposited on the bottom of the channel. For this reason the beginning of the middle course of many rivers is marked by gravel beds. Since the channel is worn more slowly the slope of the banks is more gentle and the valley is broader. The current has lost much of its velocity and it cannot remove obstacles; therefore it must flow around them, and so the middle course is characterized by numerous curves, some of which may take the river miles out of the general direction of its flow. The middle course of the Mississippi affords an excellent illustration of this fact. Again, obstructions in the middle of the channel collect deposits of silt until finally they reach the surface and form islands. Islands in the upper part of the stream, on the other hand, consist of rocks which the current has been unable to wear away.

The lower course of a river differs but little from the middle course. The current is slower, and the continuous deposit of silt raises the bed of the stream. Frequent overflowing of the low banks forms vast flood plains which, when drained, make productive farms. In case of the Mississippi this process of raising the river bed has continued until the river is higher than the surrounding country, and disastrous floods follow a break in the banks.

Cataracts and Canyons. Rivers frequently flow over rocks of unequal degrees of hardness; the softer rock is worn away, leaving the harder as an obstruction. These conditions are usually found where the current is swift, and rapids or cataracts are formed. The cataracts of the Nile and the rapids in the Saint Lawrence are good illustrations. When the soft rock lies under a hard layer a fall like Niagara is formed. In mountainous regions the swift current sometimes wears a deep channel with vertical walls forming a canyon. The Grand Canyon of the Colorado and the Grand Canyon of the Yellowstone, two of the world's most stupendous wonders, were formed in this way.

Estuaries and Deltas. A river flowing slowly into an arm of the sea, protected from great waves and high tides, deposits its silt at its mouth and builds up a vast alluvial plain called a *delta*. The deltas of the Mississippi and the Nile are excellent examples of such formations. When the bed of the river in its lower course slopes into the sea, forming a drowned valley up which the tides extend without obstruction, the silt is carried away and the mouth of the river remains a broad estuary like the Gulf of Saint Lawrence and the Rio de la Plata. These estuaries form excellent harbors, and upon them we find some of the greatest seaports. W.F.R.

Consult Russell's *River Development as Illustrated by the Rivers of North America;* Greenwood's *Rain and Rivers;* Bellasis' *River and Canal Engineering.*

Related Subjects. The following topics, which are closely related to this subject, are treated in these volumes:

Alluvium	Flood
Basin	Flood Plain
Canyon	Rain
Delta	Spring
Divide	Valley
Erosion	Waterfall

In addition to these general articles, these volumes contain articles on the following rivers:

AFRICA

Congo	Senegal
Gambia	Shire
Niger	Victoria Falls
Nile	Zambezi
Orange	

ASIA

Amur	Hoang-ho
Brahmaputra	Hugli
Euphrates	Indus
Ganges	Irrawaddy

Jordan
Lena
Mekong
Nerbudda
Ob
Sutlej
Syr-Darya
Tigris
Yalu
Yang-tse-kiang
Yenisei

AUSTRALIA

Cooper's Creek
Lachlan
Murray
Murrumbidgee

EUROPE

Adige
Arno
Danube
Dnieper
Dniester
Don
Elbe
Garonne
Loire
Main
Marne
Meuse
Moselle
Neva
Oder
Po
Rhine
Rhone
Rubicon
Saône
Save
Scheldt
Seine
Somme
Tiber
Ural
Vistula
Volga

NORTH AMERICA

Alabama
Albany
Allegheny
Apalachicola
Arkansas
Assiniboine
Atchafalaya
Athabaska, subhead *Athabaska River*
Bighorn
Brazos
Canadian
Chattahoochee
Chaudière
Chickahominy
Churchill
Colorado
Columbia
Connecticut
Coosa
Cumberland
Delaware
Detroit
East
Fraser
Genesee
Gila
Great Kanawha
Green
Hamilton
Housatonic
Hudson
Humboldt
Illinois
James
Kansas
Kennebec
Kentucky
Kootenay River and District
Lackawanna
Lehigh
Mackenzie
Merrimac
Minnesota
Miramichi
Mississippi
Missouri
Mobile
Mohawk
Monongahela
Montgomery
Moose
Nelson
Niagara Falls and River
Ohio
Ottawa
Peace
Pecos
Penobscot
Platte
Potomac
Rappahannock
Raritan
Red
Red River of the North
Restigouche
Rio Grande
Roanoke
Rock
Sabine
Saco
Sacramento
Saguenay
Saint John
Saint Lawrence
Saint Mary's
San Joaquin
Saskatchewan
Savannah
Schuylkill
Scioto
Shenandoah
Skeena
Snake
Stikine
Susquehanna
Tennessee
Tombigbee
Wabash
Washita
White
Willamette
Wisconsin
Yazoo
Yellowstone
Yukon

SOUTH AMERICA

Amazon
Jurua
Madeira
Magdalena
Orinoco
Paraguay
Parana
Pilcomayo
Plata, Rio de la
São Francisco
Tapajos
Tocantins
Uruguay
Xingu

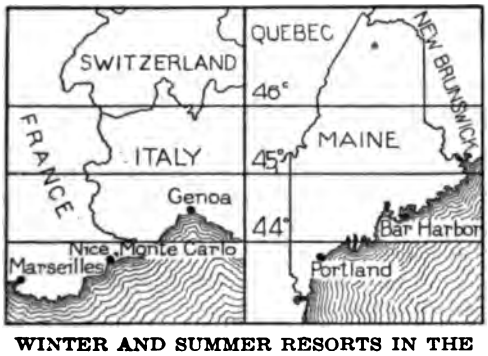
RIVERSIDE, CAL., one of the most important orange-growing centers in the United States, is situated in the southwestern part of California, on the Santa Ana River, ten miles south of San Bernardino and fifty-seven miles east of Los Angeles. The city is the county seat of Riverside County. Transportation is provided by the Southern Pacific, the Atchison, Topeka & Santa Fe and the San Pedro, Los Angeles & Salt Lake railroads, and by the Pacific Electric Interurban line. The first settlement was known as *Jurupa Rancho* when it was purchased by the Southern California Colony Association in 1870. It was incorporated as a city in 1883 and is now governed on the commission plan. The population was estimated by the Federal Bureau to be 19,763 in 1916, an increase of 4,551 since 1910. The city has an area of thirty-nine square miles.

Riverside lies about 900 feet above sea level, and is built on ground which slopes gently toward the east. It is a city of beautiful, artistic homes and public buildings, and its wide, clean streets are shaded with luxuriant growths of trees. Especially noteworthy are Magnolia Avenue, a parkway ten miles long and 130 feet wide bordered with pepper trees, and Victoria Avenue, also a parkway, lined with semitropical fruit trees. Because of its healthful climate and attractive environs Riverside is famous as a health resort.

The people are engaged chiefly in the cultivation of alfalfa and fruits, especially lemons and oranges. The San Bernardino Valley, in which the city is located, is noted for its abundant growth of fine oranges, and Riverside annually ships about 6,000 carloads of this fruit. One of the most complete and extensive systems of irrigation is in operation here. The manufacture of Portland cement is also an important industry. The state citrous experimental station is located at Riverside, and it has also a Carnegie Library, a handsome $250,000 courthouse and the Sherman Institute, an Indian school conducted by the government.

RIVES, *reevz,* AMÉLIE (1863-), since her marriage PRINCESS TROUBETZKOY, a novelist and poet, was born at Richmond, Va. Her popular work, *The Quick or the Dead,* was the most talked-of book in America when it was first published, and on its appearance the young author stepped from obscurity to wide celebrity. It describes the spiritual struggles of a beautiful woman who has lost her idolized husband, and who wins the love of his cousin, almost the former's duplicate in personal appearance. In the end, after terrible mental anguish, she decides that the influence of the dead is too potent a factor in her life for her to marry the "quick," that is, her husband's cousin. This novel was discussed, attacked and applauded; was barred from libraries and championed in pulpits. Her first book, *A Brother to Dragons,* was published in 1888. During the same year she was married to John Armstrong Chandler, from whom she was divorced a few years later. In 1896 she was married to Prince Pierre Troubetzkoy. Her later writings include *The Witness of the Sun, According to Saint John, Athelwold, Tanis, the Sand-digger, Hidden House, A Damsel Errant* and *Barbara Dering* (a sequel to *The Quick or the Dead*). In 1915 she published *World's End.*

RIVIERA, *re vya'rah,* a narrow strip of land that stretches for 172 miles along the Gulf of



WINTER AND SUMMER RESORTS IN THE SAME LATITUDE

While Maine harbors are blocked with ice, orange, olive and palm trees are at their best on the Riviera, but while the people of Nice are enduring the dry heat of summer, Americans are flocking to the cool coasts of Maine. The comfortable winters of the Mediterranean land are due to warm winds from the South Atlantic; the lower temperature of New England results from the nearness of the icy Labrador Current.

Genoa at the northern end of the blue Tyrrhenian arm of the Mediterranean Sea, between the mountains and the shore. The sun and the south winds warm it, while the Alps in the background, all gray and green with vineyards and olive groves, with swift little, rushing rivers and clanking mill wheels, shut off the north and east winds. These conditions make the climate so mild and the scenery so beautiful that the Riviera is one of the famous health resorts of the world. From Nice (in France) in the west, into Italy through Genoa to Spezia in the east, the towns and villages are almost continuous, linked together by a famous carriage road, originally built by the ancient Romans, and by a railroad which burrows through the many projecting headlands in a series of about eighty tunnels.

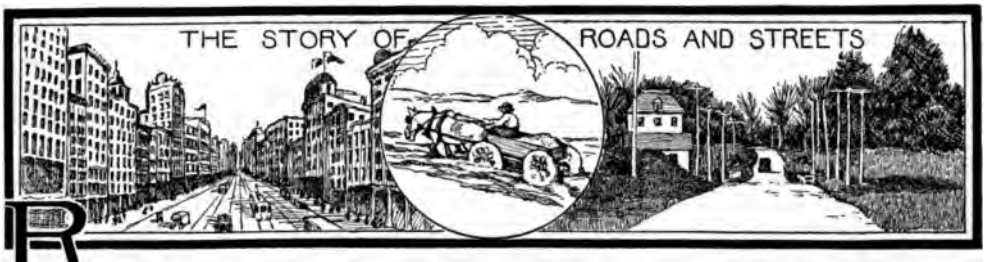
The towns are very picturesque, with houses that are rose and cream and brown in color, with green and fragrant gardens, and with shops filled with curios and trinkets that are a continuous delight to the tourists, invalids and convalescents who throng there throughout the winter months. Great masses of roses, violets and hyacinths are cultivated for the London and Paris markets, as well as subtropical fruits, dates and bananas, pomegranates and prickly pears. Some of the principal towns are Nice, Monaco, Monte Carlo and Mentone, in France, and Bordighera, Ospedaletti, San Remo, Rapallo, Levanto and Spezia, in Italy.

Consult Home's *Along the Rivieras of France and Italy;* Scott's *The Riviera.*

ROAD RUNNER, a swift-footed bird of the cuckoo family, found in the Southwestern United States and Northern Mexico, known also as the *chaparral cock, ground cuckoo* and *snake killer.* The name *road runner* refers to its habit of rac-

THE ROAD RUNNER

ing down the road in front of horsemen or vehicles. When it runs, it spreads wings and tail into a sort of aeroplane and speeds along at an amazing rate. It is nearly two feet in length and has long legs with two toes at the front and two in the back, and a large tail with graduated feathers, which it erects saucily at will. In color it is a glossy, greenish-brown, each feather being fringed with white. Its nest, which is placed in low trees or bushes, is made of sticks. In it are placed the four to six yellowish eggs. The road runner feeds on grains and insects. See CUCKOO.



ROADS AND STREETS. The word *road* is derived from the same source as *ride,* and in its broadest sense refers to a public way connecting towns and rural communities. *Highway* is a more formal term, with the same meaning, but it properly refers only to a main or principal road, as distinguished from one of minor importance. An improved road between two large cities may be called a highway, but the ordinary dirt road of the rural districts deserves the less imposing name. The term *street,* though it formerly meant any paved road, now refers only to the roadways in towns and cities. The word *street* is derived from the Latin *strata via,* meaning *paved way.*

Roads and highways have always been an index of national greatness, as well as an important factor in the advancement of a people. It has been true, almost without exception, that the older a country is and the more developed its civilization, the better roads it has had. The power and culture of Rome were shown in the splendid system of highways connecting the imperial city with distant provinces. Even in England, far from Rome, the Romans left their mark in a number of great roads, and on the continent their roads remain to this day. Many of the Roman roads, built from 1,500 to 2,000 years ago, are the foundations of modern highways, and a few of them are still in use, with practically no improvement, just as the Romans left them. As late as the eighteenth century roads in France and other parts of Europe were built by methods only slightly different from those of the ancient Romans.

Roads in Europe. In nearly all of the nations of Europe the public roads are under the general supervision of the government, and are directly in charge of trained engineers. They may be divided into two groups—the *national* roads, properly called highways, and the *local* roads, the care of which is in the hands of the local communities. A few good roads existed in Central Europe even in medieval times; an English law on roads was passed as early as 1285, and the first tolls for the repair of roads were collected in 1346. France was for several centuries the leader in the improvement of roads, and taken as a whole, the roads of France, together with those of Switzerland, are probably the best in the world to-day. Great Britain has excellent roads in the remoter rural districts as well as near the towns, and the smoothness of English roads is proverbial. Germany, too, has an extensive system of fine roads, and the kingdom of Prussia, with an area half that of Texas, has about 75,000 miles of improved roads, about one-third as much as the mileage of improved roads for the whole United States. An unimproved dirt road, in fact, will be found with difficulty in any part of Western Europe, and where one is found it is only a minor link in a great highway system.

In Canada and the United States. In America an entirely different condition exists. Except in the cities, and with one or two other conspicuous exceptions, there were few improved roads of importance either in Canada or the United States until after 1880. Europe has only one-half the road mileage of the United States, but its proportion of improved roads is several times as great. At the present time, although much progress has already been made, only ten per cent of the road mileage in the United States is improved, and in Canada the percentage is even less. The reason for this condition is not far to seek, nor is it as yet a disgraceful one. Europe had roads, and good roads, too, when the American continent was unknown to Europeans. Until the nineteenth century the greater part of North America still had no roads, and only in the states along the Atlantic coast was there any considerable mileage. About 1800 the United States was literally in the midst of a period of turnpike construction. This was only a passing phase of road construction, but the privately-owned turnpike, with a tollgate every five or ten miles, remained in common use until some time after the War of Secession. Between 1792, when the first turnpike was authorized, and 1812, over 300 charters for such roads were granted to private companies, over 4,500

miles of road had been constructed and over $7,000,000 invested. Again, about 1830, the United States was in the midst of a road-building period. During these years the Federal government was building the only great highway it ever undertook, the Cumberland Road (which see), also called the "great national pike."

In the meantime, during the first half of the nineteenth century, the United States had vastly increased its area, until it extended from ocean to ocean. As the flood of immigration spread over the Mississippi Valley and the West, there was an immediate necessity for roads. They were needed on such a vast scale that there was neither time, labor, nor money to build improved roads. This period of expansion was followed by an area of railroad construction, which opened up a still vaster territory. For a generation or two the population of any newly-settled region is too busy wresting a livelihood from the soil to give its attention to such secondary matters as road building. This was true in the United States and to some extent it is true in Canada at the present time. It is only when a community has, in a sense, grown up and reached some degree of stability that it begins to consider the advantages of good roads, and to bring these advantages within reach of its citizens.

Improved Roads and Pavements

An improved road is one that has been properly graded and drained, and has been given a surface covering of some material which makes it reasonably firm and durable. Such a covering is called *pavement,* a word derived from the Latin *pavire,* meaning to *beat* or *tread down.* The ancient city of Babylon had paved streets, and the pavement probably consisted of beaten clay, laid to a considerable depth to present a hard and even surface. The old Roman cities of Pompeii and Herculaneum were paved with stones and volcanic matter thrown from the crater of Vesuvius.

Stone. Stone blocks, preferably of granite, form the most durable pavement, but they have great disadvantages. The noise of heavy vehicles drawn over stone pavements is very trying, and the uneven stones severely test the wearing qualities of wagons. Granite pavement is very expensive, but when properly laid will last for years without repair. It is used largely in cities and areas carrying much heavy traffic.

Macadam and Concrete. Pavements made of small, crushed stone, instead of large blocks, have been in general use since the beginning of the nineteenth century. This form is called *macadam,* from the name of the Scotch engineer, John L. MacAdam (1756-1836), who introduced it. Formerly all macadam was *water-bound;* that is, the stones were held together by a natural cement of dust and moisture. Macadam marked a great advance in paving methods, but it does not wear well under heavy or fast traffic. Water-bound macadam, moreover, is dusty in dry weather and hard to clean. Its place is gradually being taken by bituminous-bound macadam, which is made in the same way except that a special cement of asphalt or tar is used. The binder may be mixed with the stones before the pavement is laid, or may be sprinkled on it afterward. Bituminous-bound pavement which is mixed before laying is usually called bituminous-concrete, or merely concrete.

Asphalt. This form of pavement consists of two parts, a *binder* and a *wearing surface,* laid on a solid foundation. The foundation is usually of concrete, and the binder, which serves to unite the foundation and the wearing surface, is of small, broken stones mixed with an asphaltic cement. The wearing surface is a mixture of sand, Portland cement (or carbonate of lime) and asphalt, mixed together at a high temperature and then spread on the roadway. Asphalt pavement is sometimes laid in blocks, the mixture being first molded by machine, and then when cold laid like bricks. It is noiseless and easily cleaned, but is not suitable for heavy traffic (see ASPHALT).

Brick. In recent years the use of brick for paving has greatly increased. The bricks intended for such use are specially prepared and are so hard-burned that they have a glassy appearance. When laid on a foundation of concrete, brick will sometimes outwear every other kind of pavement except stone blocks. It is easy to clean, but it has the disadvantage of being very noisy for horses and metal-tired wagons. It is an excellent pavement for roads on which automobile traffic is heavy and other forms of traffic are light.

Wood. Wood pavement is made of round or brick-shaped blocks of wood with the spaces between them filled with tar or a mixture of tar and sand. Round blocks were formerly in common use, but have now been almost en-

tirely superseded by brick-shaped blocks, which are much more expensive and provide a much smoother surface. Wood possesses the great advantage of silence, the heaviest traffic passing over it almost noiselessly. The wood, usually cedar or yellow pine, undergoes a special treatment called "pickling," or soaking the blocks in creosote or tar. Wood pavement wears unevenly, and is not economical, but its use is increasing, as the smoothness of the road and the silence of traffic are considered sufficient compensation for the extra cost of upkeep.

Comparative Cost. The cost of paving a street varies greatly according to local conditions. The initial cost of grading, the freight charges on materials, the character of foundations, conditions in the local labor market—all must be considered. Comparative costs, unless based on similar conditions, are worse than useless. The following figures are careful estimates which should not be taken as exact for every section, but are fairly accurate as a basis of comparison. They have the advantage of being based on similar conditions.

Sand-clay, per mile of 15-foot road..$600 to 800
Burnt-clay, per mile of 15-foot road..... 1,500
Macadam, per mile of 15-foot road..... 5,000
Concrete, per mile of 15-foot road.....10,000
Asphalt, per mile of 15-foot road.....15,000
Wood-blocks*, per mile of 15-foot road....20,000
Brick, per mile of 15 foot road...15,000 to 20,000

*On concrete base, which represents about one-half the total cost.

Comparative Life of Pavements. The life of a pavement, or the period during which it may be used before renewal, necessarily depends on the heaviness of the traffic and the amount of repairing done from time to time. Under ordinary conditions granite blocks will serve for twenty years or longer; asphalt, eighteen years; brick, fifteen years; wood blocks, ten to fifteen years; bituminous concrete, eight to ten years; macadam, eight years. Much depends upon the quality of material.

The Good Roads Movement

At the beginning of the twentieth century the United States had about 2,250,000 miles of roads, of which less than eight per cent was improved. The 2,000,000 miles or more of unimproved roads are ordinary dirt roads. Once outside the limits of cities and towns the traveler in 1880 and 1890 was sure to find nothing but a natural dirt road, filled with ruts, muddy in rainy weather and rough in dry seasons. So long as travel on country roads was limited to horses and horse-drawn vehicles, the attempts to maintain good country roads were hardly more than spasmodic. The introduction of the bicycle and the automobile, by increasing the speed of vehicles and by widening the circle of pleasure excursions, became one of the chief factors in leading to a demand for good roads. Rural communities, however, are now also awake to the actual money profit there is in good transportation to markets and to the other advantages of good roads.

Benefits of Good Roads. There is no fixed standard by which the benefits derived from good roads can be measured, although it is now generally acknowledged that these benefits are real and positive. No community which has improved its roads has ever regretted the step. So closely are the public roads connected with every aspect of community life that any method of measuring the benefits of good roads is incomplete. For convenience, however, they may be divided into economic benefits and social benefits.

Economic Benefits. There are certain direct advantages which follow the improvement of roads. First is the lower cost of hauling, which may be the result of better road surface, of lower grades or of shorter distances. The farmer is enabled to haul to market the same load with greater speed, and consequently in less time, or a greater load in the same time. A reduction of time is equivalent to a reduction of distance from the market centers. Good roads, therefore, bring the farms nearer to town, and it is easy to see that improved roads mean greater farm values. In addition, a good road makes hauling largely independent of the season or weather conditions. Market prices, even for staple crops, show considerable variation throughout the year. Where bad roads prevail it is not uncommon for the farmer to find that he must move his crops not when the market price is favorable, but when the roads are fit for travel.

Every farmer sooner or later realizes the desirability of diversified crops. Diversified farming usually involves a change from staple crops, such as corn and wheat, which can be stored, to more perishable vegetables and fruits, which must be moved from the farm at once after they ripen. The prime requisite for di-

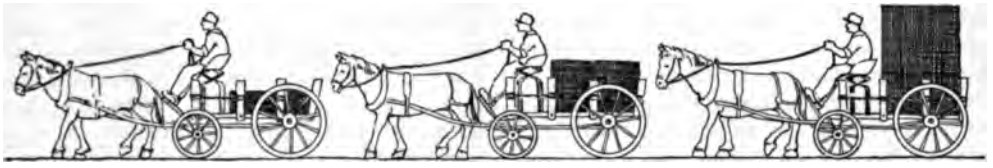
versified farming is a good market. The market may be a near-by town, or it may be a distant city, with railroad connections. In any case, speed of transportation from the farm to the unloading point is essential. A farmer who lives ten miles from town and raises peas, spinach and other spring crops, is at a great disadvantage if his market road is poor, whereas the farmer twenty miles from town, but on a good road, may visit the market every day without great expenditure of time.

When any community passes from a condition dominated by bad roads to one characterized by good roads, land values in the community rise. In cities, in fact, an owner of land usually adds the taxes for paving and other improvements to the price he fixes for the land. Of course, a good road does not add to the fertility of the soil, but it does improve the *site value,* the value of land with reference to markets, schools and towns. Any increase in value is partly offset by taxation, but it has been found in every case that the landowner appreciates the improvement and sets an increased price on his property.

The roads of the United States and Canada are being used each year by an increasing number of tourists, many of them in automobiles. Automobilists visiting Colorado spend in that state alone about $3,000,000 a year. This is a return which more than pays the cost of maintaining good roads and leaves a margin of profit. Much has already been done by motor tourists to secure good roads, and the sentiment in favor of good roads owes more to automobile owners than to any other single factor.

Social Advantages. One result of good roads may be better schools. The place of the one-roomed red schoolhouse is being taken gradually by the graded, consolidated country school, with several teachers under a competent principal. Consolidated schools are possible, however, only where the roads are kept in good condition. Poor roads often prevent the consolidation of several small, weak schools into one strong school. Even the district school suffers from poor roads, for it is a common practice for parents to keep their children home in severe weather which makes the roads impassable. Good roads also encourage the use of the schoolhouse as the social and intellectual center of the community. Grange meetings, lectures, entertainments and institutes of various kinds may well be held in the schools, but if the people are to get the full benefit from their schools, the buildings must be accessible at every season.

The improvement of rural free delivery service is dependent on the improvement of roads. Regular mail delivery demands improved roads, and in some cases rural delivery has been abandoned by the government because of poor roads. All social activity in rural communities is dependent on the roads. Poor roads discourage attendance at public meetings or even neighborly visits, and under the worst conditions all travel is suspended. The importance of a good road is also great in another way, less tangible, less easy to value, but none the less vital. It is a matter of common observation that a well-built, well-kept road has aesthetic value. Aside from being more attractive in itself, it encourages the owner of land to keep his place in order. It is no wonder that a slimy, muddy bog in front of a farmer's door reacts on the whole family. An improved road is not only good in itself, but it may stimulate the residents along its borders to greater effort and greater self-respect.



THE AVERAGE LOAD ON VARIOUS ROADS

At the left is a representation of a load that can be carried on a dirt road; in the center, on a macadam road; at the right, on an asphalt road.

Some Conditions to Consider. Road making has become a highly developed branch of engineering. Expert work begins with the laying out of a road, avoiding on the one hand the meandering course of New England roads and the angularity of the section line roads of the Middle West. It is a recognized principle to avoid the heavy grades of hills as much as possible by winding around the hill, and to deviate from a straight line to avoid lowlands, or any place where drainage would be defective, for the necessity of thorough drainage is appar-

ent. Scenic effects are considered. A slight deviation that will include a commanding view is advisable, and the value of roadway trees is also recognized. All such accessories have an influence that is helpful to the community.

The greatest care should be bestowed on drainage ditches, necessary culverts and surface conditions. With a mileage so enormous as in the United States and Canada, it is manifest that for many years the larger part of the roads will be dirt roads; but that does not mean they cannot be improved. Engineers are studying every phase of the problem. Everywhere important trunk lines, the true highways, are receiving special attention; particularly good roads of this nature exist in Southern New England, in New York, Indiana and Ohio.

Results Already Accomplished. Steady progress is being made, both in the United States and Canada. For many years the improvement of country roads was left in the hands of the local communities, the county, the town or township, and the village. The road tax was often "worked out" by farmers and others who owned horses. Road making was regarded as something anybody could do; it was not considered as an exact science. It was not until after 1890 that the interest of the community at large in good roads began to be recognized. Before 1900 Massachusetts, New Jersey and several other states had constructed the first state roads. Since then about two-thirds of the states and several of the Canadian provinces have built roads or contributed a part of the cost. It is customary, though by no means a fixed rule, for the county to contribute one-half of the expense, leaving the other half to be appropriated by the state or province.

Still more recently many people have urged the national government to undertake the construction and maintenance of roads, on the ground that good roads, outside of thickly-settled communities, are a national problem. As early as 1893 the Congress of the United States established a bureau of public roads as a branch of the Department of Agriculture, and this bureau has been of great service, chiefly by building model roads in various parts of the country. Each year it sends out a "good roads' train," carrying the latest road-making machinery. At frequent intervals the engineers in charge construct short pieces of road, giving the local authorities an object-lesson in road making. In the national parks, such as the Yellowstone and the Yosemite, the government has maintained excellent roads, and it has from time to time made small appropriations to assist the states. In 1913 Congress appropriated $500,000 to be spent in coöperation with the states for the improvement of post roads, and early in 1914 a start was made on a new policy by a law appropriating $25,000,000 a year to be divided among the states, each state's allotment being available only on condition that it appropriate an amount equal to that received by it.

This appropriation, large as it is, is only a beginning of the solution of the problem. One of the leading advocates of good roads once drew up a plan for a comprehensive national system, to be built and maintained by the United States government. Investigation showed that the initial cost would be about $650,000,000, and the yearly expense of maintenance about $90,000,000, a cost which was considered prohibitive. It costs each year about $600,000,000 to carry the products of farms to market—in the United States alone. If this annual cost could be reduced by one-fourth, or $150,000,000, the construction of a comprehensive road system would be a paying investment, provided the annual expense and interest charge were less than $150,000,000. This is within the range of possibility.

As yet, perhaps, the most conspicuous results of the good roads movement are the plans for national and international highways. One of these, the *Meridian Road,* is to extend southward from Winnipeg to the Gulf of Mexico. The *Dixie Highway,* farther east, is to extend from the Great Lakes to the Gulf of Mexico, and the *Lincoln Highway* is to extend from the Atlantic to the Pacific. The *National Parks Highway* is projected between Chicago and the Pacific coast, through the states bordering on Canada. Besides the American Highway Association, organized in 1910, there are about 700 local associations, all interested in road improvements. As an evidence of the scientific character of the study now being made of the problem, it is interesting to note that about seventy colleges and universities offer instruction in highway engineering. W.F.Z.

Consult Gillette's *Economics of Road Construction;* Morrison's *Highway Engineering;* Judson's *City Roads and Pavements.*

Related Subjects. The following articles in these volumes may be consulted in connection with this discussion of roads and streets:

Asphalt
Cumberland Road
Dixie Highway
Highway
Lincoln Highway

ROANOKE, *ro'a nohk,* VA., an industrial city in Roanoke County, in the southwestern part of the state, and on the Roanoke River. Lynchburg is fifty-four miles east, Richmond, the state capital, is 199 miles east, and Washington, D. C., is 227 miles northeast, by rail. The Norfolk & Western and the Virginian railways enter the city, and an electric line is in operation to Salem, to the west. Big Lick was the name of the place when it was founded in 1852. In 1882 it received its present name and in 1884 it was chartered as a city. In recent years the growth has been remarkable. In 1880 the population was only 639; in 1910 it was 34,874, and it was 43,284 in 1916 (Federal estimate). The city ranks third in the state, following Richmond and Norfolk.

Owing to its picturesque and healthful location in a valley between the Blue Ridge and the Alleghany Mountains and to medicinal springs in the vicinity, Roanoke has become noted as a health resort. The city has four recreation grounds, six hospitals, a sanitarium, and a hotel built on the mountain at an elevation of 2,100 feet and reached by an incline railway. Among the newer edifices of the city are a $250,000 city hall, a $150,000 Y. M. C. A. building and a $50,000 armory; it also has a Federal building, a courthouse, an academy of music and several fine business buildings. For higher education there are Virginia College, for women; Elizabeth and Roanoke colleges, both Lutheran, and Hollins Institute, for young ladies, under Baptist supervision.

Formerly Roanoke was a prominent tobacco center, but its chief interest now lies in iron mining and farming, the leading manufactories being dependent on the former industry. Bridges, structural steel and iron, agricultural implements, hydraulic engines and silos are among the important products; the large shops of the Norfolk & Western Railway (about 3,000 employees) are located here, and there are in addition tobacco and canning factories and bottling works. J.W.

ROANOKE RIVER, a river in North Carolina and Virginia. Some authorities apply the name to the stream formed by the union of the Dan and the Staunton rivers, and others consider the Staunton and the Roanoke to constitute one river, having the Dan as a tributary. If the latter view is taken the river may be said to rise in the Blue Ridge Mountains in Southwestern Virginia and to flow in a general southeasterly direction for 450 miles, emptying into Albemarle Sound. The Dan enters the stream at Clarksville, Va. For small boats the Roanoke is navigable for its entire length, for larger steamers as far as Weldon, N. C. At Halifax a dam has been built to supply the city with water power, and a canal has been cut around the dam to keep the river open to commerce. Plymouth, a town near the mouth, is a trade center for cotton, peanuts, rice and tobacco.

ROBBERY, *rob'er i.* Three men armed with revolvers entered a bank during business hours, intimidated the employees by threatening to shoot them if they offered any resistance, and took away with them several thousand dollars. Two men in an automobile met a farmer going to the city, overpowered him and forcibly took one hundred dollars from him. All these men were arrested, tried and convicted. Those who took the money from the bank were convicted of *robbery;* and the others of *highway robbery.*

In criminal law, *robbery* consists in taking from a person by violence or intimidation money or goods to any value whatever. Robbery is a crime classed as a felony (which see), and in all states and provinces it is punishable by imprisonment. The value of the property taken has but little influence in determining the penalty, except that it must be of some value to the person from whom it was taken. *Highway robbery* consists in robbing a person on the street or on a road.

Related Subjects. The reader is referred to the following articles in these volumes:

Burglary	Felony
Crime	Larceny
Criminology	Procedure

ROBBIA, *rohb'byah,* DELLA, the name of a family of Italian sculptors who flourished during the days of the early Renaissance.

Luca della Robbia (1399-1482) exercised his greatest influence as the founder of a school of sculpture in which the medium used was glazed or enameled terra cotta. "Robbia ware" became famous throughout all Europe. However, the secret of its invention never went beyond the Robbia family, and after the death of the last member no more was made. Luca della Robbia ranked with the best of his contemporaries in the production of beautiful forms, and he was distinguished for his work in marble and bronze, as well as for his reliefs in terra cotta. His Madonnas and saints made him the typical religious sculptor of his day.

Andrea della Robbia (1437-1528), the nephew of Luca, made a much wider use of terra cotta and carried the art into the smaller towns. He

adorned churches at Arezzo, Prato, Siena and Florence, but only his earliest work embodies the dignity which always characterized the achievements of his uncle. His five sons continued the activities of the family, but they contributed nothing to the development of art.

ROB'ERTS, CHARLES GEORGE DOUGLAS (1860-), a Canadian poet and novelist, one of Canada's most versatile men of letters. Though he is best known for his poems and for his stories about animals, Roberts has been at various times a newspaper and magazine editor and a college professor. In his poems he shows imagination and artistic finish; in his novels he displays to excellent advantage his powers of description of natural scenery; and in his animal sketches reveals a remarkable knowledge of, and sympathy for, animals. The animals to him are all but human. His masterpiece in this field is *Red Fox.*

Roberts laid the scene of most of his literary productions in New Brunswick and Nova Scotia. He was born at Douglas, near Fredericton, N. B., was educated at the University of New Brunswick, and made his home in that province and in Nova Scotia for many years. He lived in Toronto from 1883 to 1884 as editor of Goldwin Smith's newspaper *The Week,* and from 1885 to 1895 taught in King's College (Windsor, N. S.), first as professor of English and French literature and later of English and economics. In 1897-1898 Roberts was associate editor of the *Illustrated American,* published at New York.

Of his poetry, probably the best is *Ave: An Ode for the Shelley Centenary,* a poem which is regarded as one of the finest ever written by a Canadian. His first published volume, which appeared when he was twenty, was *Orion and Other Poems. In Divers Tones, Songs of the Common Day, The Book of the Native* and *New York Nocturnes* are other volumes of verse. Of his many novels and sketches the following are most important: *The Raid from Beausejour; Around the Camp Fire; The Forge in the Forest; By the Marshes of Minas,* a volume of short stories; *The Heart of the Ancient Wood; The Kindred of the Wild; Red Fox,* already mentioned above; *Barbara Ladd,* an historical novel; *Neighbors Unknown; Feet of the Furtive,* and *Hoof and Claw,* these last three all being stories of animals. Roberts also wrote an excellent one-volume *History of Canada.*

For examples of his verse, consult *Oxford Book of Canadian Verse.*

ROBERTS, FREDERICK SLEIGH, Earl of Kandahar, Pretoria and Waterford (1832-1914), a British soldier known affectionately throughout the world as "BOBS," was born at Cawnpore, India. Educated at Eton, the Royal Military College at Sandhurst and the East India Company's military college at Addiscombe, he received a commission in the Bengal artillery in 1851. For twenty-five years he served with the Indian army, becoming noted for his great military ability and genius in transporting and supplying troops, and became commander-in-chief in 1885. For gallantry in action at Khudajanj he obtained the much-prized award of the Victoria Cross. During his varied and efficient service in India Roberts performed a remarkable and memorable march to Kandahar. With a force of 10,000 men he marched 313 miles through hostile territory in twenty-two days and on the twenty-third day gained a complete victory over the rebels who besieged Kandahar, though his force was far outnumbered and had suffered terribly on the march. He was officially thanked by Parliament and created a baronet. For his further services while commander-in-chief in India he was raised to the peerage as Baron Roberts of Kandahar and Waterford.

After the opening disasters of the South African War (Boer War), in which Lord Roberts lost his only son, he was sent to Africa to take supreme command. Arriving at Cape Town in January, 1900, he quickly changed the aspect of affairs. War was carried into the enemy's country, Mafeking and Ladysmith were relieved, and Bloemfontein, Johannesburg and Pretoria fell into the hands of the British. The whole of Roberts' march through South Africa was a series of brilliant flanking movements avoiding the fearful loss of men due to the frontal attacks previously delivered. The war assuming a guerilla aspect, the command was handed over to Lord Kitchener, and Roberts returned to England where he was awarded an earldom, a grant of $500,000 and was made commander-in-chief of the British army.

On the outbreak of the European War in August, 1914, Lord Roberts, although then eighty-two years of age, was appointed to the command of the British expeditionary force during mobilization at Aldershot. He did not assume charge of the British columns on the Continent, that command being assigned to Sir John French and later to General Haig. In November of the same year Lord Roberts visited the battle front in Northern France; while

in camp with the troops from India he contracted a severe cold which developed into pneumonia, and within twenty-four hours he died, on November 14. F.ST.A.

ROBERTSON, JOHN ROSS (1841-), a Canadian journalist, founder of the Toronto *Evening Telegram,* which met with remarkable success from the beginning and became one of the leading papers of the Dominion. Robertson is also known for his high standing as a Mason, and has written histories of the Freemasons and of the Knights Templars in Canada. Robertson was born in Toronto, attended Upper Canada College, and after serving his apprenticeship as a reporter, and as editor of a weekly satirical paper which he founded, he was city editor of the Toronto *Daily Globe* from 1864 to 1866. He was one of the founders of the *Daily Telegraph,* which lasted only six years. Then from 1872 to 1875 he lived in London as correspondent for the *Daily Globe.* Returning to Canada in 1875 he assumed the business management of Goldwin Smith's *Nation,* but a year later established the *Evening Telegram.* In addition to his books on Masonry and his contributions to journalism, he wrote *Talks with Craftsmen* and *Landmarks of Toronto,* and edited the diary of Mrs. John Graves Simcoe.

ROBESPIERRE, *ro bes pyair',* MAXIMILIEN MARIE ISIDORE (1758-1794), one of the most celebrated of the French revolutionists, was born at Arras. He was educated in the college of Arras and the College Louis-le-Grand at Paris and after studying law in the latter city returned to Arras to begin a legal career. He speedily became known as a skilful advocate, a man of integrity and the possessor of a nature so kind that in 1782 he resigned a position as criminal judge rather than pronounce a death sentence. He was an enthusiastic student of Rousseau and at the approach of the French Revolution thought he saw an opportunity to establish the ideal society which Rousseau had described. He therefore began to speak for the liberal democratic views then popular among the French middle-classes, and when the States-General, or National Convention, met at Paris in 1789, he was sent as a representative.

ROBESPIERRE
The fate which he meted out to hundreds of Frenchmen overtook him.

He had back of him the enthusiastic support of the Jacobins, who believed in severe measures toward royalty, and these partisans saw to it that the common people heard often about his speeches and deeds in their favor. He became bold and bitterly opposed the policies of the Girondists, or believers in milder measures toward the nobility. After the storming of the Tuileries he was elected a member of the Commune of Paris, and his popularity with the common people gave that organization the strength to carry out its decrees. Then came the trial of Louis XVI, on January 1, 1793, in which Robespierre stood firmly and successfully for the death sentence, and thus gained the friendship of the radical revolutionist Danton, just then rising to power.

Four months later Robespierre helped to establish the Committee of Public Safety, and through its work gained ill fame which will doubtless follow him through all history. This committee resolved to crush all dissension at home so that a united country might face its foreign enemies, and to this end the "Terror," or reign of the guillotine, was established. To some extent Robespierre has been unjustly accused of inciting this period of violence. He had but two allies in the committee of twelve, and could not have dictated affairs. Moreover, whatever he permitted was for the purpose of ridding the country of the discontented, who might hamper the ideal society which he firmly believed was coming; while his companions on the committee saw in the wholesale butchery a thorough and rapid way of disposing of their own political enemies. Be that as it may, between June 12 and July 12, 1794, this organization sent to the guillotine nearly 1,300 people.

Meanwhile, even his political allies began to fear his power, and the Committee of Public Safety decided to make him the scapegoat for the butchery of the Terror. On July 26 he defended himself in such a forceful speech that the Convention voted to follow his suggestion of ceasing the wholesale execution, and placed no blame upon him for the record of the terrible weeks which had passed. The next day, however, his enemies rallied their forces and caused the Convention to declare him "outside the law," meaning, practically, an outlaw. During the attempt to arrest him at the Hotel de Ville, part of his jaw was torn away by a bullet, and

in this horrible condition he was brought before the Convention. Unable to defend himself, he was sentenced to the guillotine and was executed the next day, July 28, 1794.

His private life was clean, and his manners and tastes those of a gentleman. He was by nature a dreamer and an idealist, and only his oratory gained him his position as an executive. C.H.H.

Consult Warwick's *Robespierre and the French Revolution;* Belloc's *Robespierre.* A great novel dealing with the Revolution is Dickens' *Tale of Two Cities.*

Related Subjects. The following articles in these volumes will make clear certain references in this sketch of Robespierre:

Commune of Paris	Jacobins
Danton, Georges Jacques	Louis XVI
French Revolution	Mirabeau, Count de
Girondists	States-General
Guillotine	Tuileries

ROB'IN, a North American songster of the thrush family, called by John Burroughs "the most native and democratic" of American birds. The robins are so sociable and are seen in such numbers around our dwellings that they have

Each morning, when my waking eyes first see,
Through the wreathed lattice, golden day appear,
There sits a robin on the old elm tree,
And with such stirring music fills my ear,
I might forget that life had pain or fear,
And feel again as I was wont to do,
When hope was young, and life itself were new.
—WELLS: *The Old Elm Tree.*

never attained the reputation enjoyed by some of the more secluded birds of the woodlands. Yet, as one authority has said, "Let the robin hide in distant forests and reveal himself to a lucky few only, and there would be no bird that could excel his beauty, dignity or song." Robins are rather large birds, measuring about ten inches from beak to tail. Their plumage is attractive, the orange-red breast contrasting prettily with the olive-gray upper parts, brownish wings and black head. White markings are found on the throat and tips of tail feathers and below the tail. Except in the autumn, when male and female are much alike, the coloration of the female is duller than that of her mate.

These birds have a wide range, for they breed from Mexico to Alaska, and their winter migrations take them south to Guatemala. They are among the first birds to come back from the south, a fact which has given rise to the familiar sayings—"The robin has come and spring is here;" "Good luck to see him first on highest branch." While the birds are mating they fill the air in the morning and evening with joyous, ringing notes, which sound much like *cheerily, cheerily, cheerily.* Male and female labor together in building the nest, and a pair often returns to the same spot year after year. A favorite site is a crotch on a horizontal branch or a ledge about a barn or house. The nest is fashioned into a cup-shaped mold of straw, rags and paper, cemented with mud. Both birds share in the work of hatching the three to five blue eggs.

Robins are voracious eaters, and over half of their food consists of fruit. As they like wild berries better than the fruits of garden or orchard, the cultivated cherries and berries may be protected by the planting of wild shrubs near by. Their food includes also large numbers of insects and worms, and for this reason they are an aid to the farmer. Robins are protected from indiscriminate slaughter both in the United States and Canada (see BIRD, subtitle *Government Protection of Birds*).

The European robin, also called *redbreast,* is a smaller bird than the American, and of more brilliant plumage. It belongs to the warbler family. According to an old English legend, this "pious bird with the scarlet breast" mercifully picked a thorn from the crown of Christ as He was on His way to Calvary, and as the bird carried it in its beak, the blood dropped from the piercing point to its breast, dyeing it red. B.M.W.

Consult Lange's *Our Native Birds;* Beals' "Some Common Birds in Their Relation to Agriculture," in *Farmers' Bulletin No. 54,* United States Department of Agriculture.

ROBIN HOOD, a very popular hero of English legend. The old ballads describe him as an outlaw, living with his yeomen in Sherwood forest, in Nottinghamshire. He was the most virtuous and gentlemanly of outlaws, for he

never molested or permitted his men to trouble poor travelers, or any company in which a woman was present. On the contrary, he often shared with the needy the spoils which he took from his wealthier victims, for no rich knight, and even more surely no rich clergyman, passed through his forest domains without being robbed. The outlaws lived an out-of-door life, depending for food on the supplies taken from travelers and on the king's deer which they shot.

Whether or not such a character ever really lived has been a subject for much discussion. Scholars have written books which seemed to prove absolutely that Robin Hood did live, and which even gave the period of history when he flourished, but a rival scholar has also been able to advance very weighty arguments to show that he was not an historical character. Some authorities hold that the stories about him are in reality fairy stories, told about some woodland sprite, and that belief in his human existence grew out of this. The literature about him is extensive, for poems, stories, operas and dramas have been built around his exploits. The old ballads which gave the original account of him date back to the beginning of the fifteenth century, but references in literature show that the tales were current before that time. One ballad series, *A Little Geste of Robin Hood,* is among the earliest ballads ever written, but it is evidently a compilation of earlier short poems.

The famous outlaw has been much used as a character in modern writings: Scott introduces him as Locksley, in his *Ivanhoe;* Tennyson made him the central figure of a drama, *The Foresters;* Howard Pyle wove the old tales into his very successful *Merry Adventures of Robin Hood,* and Reginald De Koven used him as hero for the comic opera *Robin Hood.*

Probably the best edition of the tales of Robin Hood is Pyle's *Merry Adventures of Robin Hood.* Other recommended books are Creswell's *Robin Hood and His Adventures;* Finnemore's *The Story of Robin Hood and His Merry Men.*

ROBINSON, Sir John Beverley (1791-1863), a Canadian jurist and statesman, for many years the leader of the Tory party in Upper Canada, or, perhaps more accurately, the chief of that group of Tories which is known in history as the "Family Compact." Though his conservative tendencies have at times been allowed to overshadow his abilities, Sir John must be recognized as one of the most brilliant men of his day. He was a clever political leader, a good lawyer, and an eminent judge. During the quarter of a century for which he was chief justice of Upper Canada, not a single one of his decisions was ever reversed on appeal.

Robinson was born at Berthier, Quebec, of United Empire Loyalist stock. He attended Dr. Strachan's school for boys at Kingston, and was much influenced in his ideas on religion and politics by the future bishop. After leaving school Robinson studied law, and in 1812 was called to the bar. In the same year he served temporarily as attorney-general for Upper Canada, but at the outbreak of the War of 1812 he volunteered for service. At the close of the war, in 1815, he was appointed solicitor-general, and in 1818, attorney-general. He was attorney-general until 1829, and from 1829 to his death was chief justice of Upper Canada. In both these positions he wielded a powerful influence, which was uniformly thrown against the Reformers. Robinson, in fact, was the leading spirit among the Conservatives, or Tories. He opposed the legislative Union of 1841 as a temporary makeshift, but he strongly advocated a federal union of British North America.

ROBINSON CRUSOE, a story by Daniel Defoe, published in 1719. It is usually considered as the first English novel, in the modern sense of the term, and though it is almost two hundred years old, it has never lost its popularity. Founded on the adventures of Alexander Selkirk, who was shipwrecked and cast away on the island of Juan Fernandez, it gives a careful, circumstantial account of Crusoe's shipwreck and his method of life on an uninhabited island. Defoe was a master of realism, and his telling use of detail makes the story seem a genuine history. In a measure it has served as a model for romances of adventure ever since, and it remains one of the most fascinating boys' books ever written. It has been translated into various languages, and many simplified editions for children have been issued. There is a charm about Defoe's language and manner, however, which no translation in words of one syllable can attain.

For illustration of Selkirk monument and inscription, see Juan Fernandez, page 3177.

ROB'LIN, Sir Rodmond Palen (1853-), a Canadian statesman, for fifteen years premier of Manitoba, then, suddenly, in 1915, compelled to resign by the exposure of fraud and bribery among members of his government. His political opponents charged, with some show of evi-

dence, that Roblin knew about the graft and was even personally interested in it. The public scandal caused by the disclosures, which affected construction of the Parliament Buildings at Winnipeg, compelled Roblin's resignation from the premiership and subsequently led to his criminal prosecution.

Roblin was born at Sophiasburg, Prince Edward County, Ontario, and was graduated from Albert College, at Belleville. As a young man of twenty-seven, he removed from Ontario to Manitoba, where he became a farmer and grain merchant. He then took an active part in local politics, was reeve for five years and warden for two years of Dufferin, and in 1888 was elected as Conservative member of the Manitoba assembly. He became premier in 1900, succeeding Sir Hugh Macdonald. During his premiership of fifteen years, Manitoba made conspicuous industrial progress, due in a considerable degree to the policies of the Roblin government. Roblin was recognized as a strong advocate of Canadian industry, and opposed the Taft-Fielding reciprocity agreement of 1911. He was created a Knight Commander of the Order of Saint Michael and Saint George (K. C. M. G.) in 1912.

ROB ROY (1671-1734), a famous Scottish outlaw whose adventurous career is known to every reader of Scott's novel, *Rob Roy*. His exploits are also the theme of a popular light opera by Flotow. Rob Roy is sometimes called the "Robin Hood of Scotland," for both names have romantic and legendary associations (see ROBIN HOOD). This Scottish outlaw was the son of Donald Macgregor of Glengyle. His mother was a Campbell, and he was given the Christian name of Robert. When the Macgregor clan of Glengyle was outlawed the youth took his mother's family name, but he was always popularly known as Rob Roy. *Roy,* the Gaelic word for *red,* was applied to him because he had reddish hair and a florid complexion. He had a powerful physique, though he was not much above the average in height, and was widely known for his great strength and his skill in the use of the sword.

Having inherited land in the Highlands, Rob Roy began to raise cattle for the English markets, but he soon found it necessary to gather about him a band of armed clansmen to protect his herds from marauding outlaws. His own career of outlawry was the result of unwise speculations, for he was compelled to borrow money from his neighbor, the Duke of Montrose, and when the loan was not repaid the duke evicted him from his property and placed him under the ban. In desperation, Rob Roy organized a band of followers against the duke and his tenants, stealing both their cattle and their rent money. For a long time he evaded all attempts to capture him, but in 1722 gave himself up to the English authorities. He was imprisoned and sentenced to be transported (1727), but was pardoned and permitted to return to Scotland. There he spent the rest of his life.

Consult Macleay's *Historical Memoirs of Rob Roy* and introductory chapter of Scott's novel.

ROB'SON, MOUNT, the highest mountain in British Columbia. It belongs to that range of the Canadian Rockies which culminates in the region of the Athabaska and the North Saskatchewan rivers. It is 13,068 feet in altitude, and is situated not far from the boundary between British Columbia and Alberta (see map on page 934).

ROC, *rok,* a huge bird of Arabian mythology, believed to have dwelt in the vicinity of Madagascar. Sindbad the Sailor, in *The Arabian Nights' Entertainments,* came upon a roc's egg that was fifty paces round. When the roc appeared, her wings darkened the sun. Sindbad tied himself to one of her legs as she sat over the egg, and was carried away. There is, needless to say, no foundation in fact for these stories.

ROCHAMBEAU, *ro shahN bo',* JEAN BAPTISTE DONATIEN DE VIMEUR, Count de (1725-1807), a French soldier who did valiant service under Washington in the Revolutionary War in America. Born at Vendome, France, he was educated for the Church, but adopted the military profession instead, entering the army in 1742. In the War of the Austrian Succession he distinguished himself, and was appointed governor of Vendome in succession to his father. The Minorca Expedition in 1756 gave him further opportunities to gain distinction; the Seven Years' War in Germany also added to his reputation, and in 1780, with rank of lieutenant-general, he was sent at the head of 6,000 French troops to assist Washington

COUNT ROCHAMBEAU

against the British. For a year his army was kept inactive in Rhode Island, owing to the blockade of the French fleet by the British. In 1781, however, he joined Washington on the Hudson.

During the ensuing campaign he put himself under the orders of Washington and took part in the operations which culminated in the surrender of Cornwallis at Yorktown. Congress voted the thanks of the nation to Rochambeau and his troops.

Returning to France in 1783, he was appointed governor of Picardy and Artois and was made a marshal of France. Although in sympathy with the Revolution, the excesses of the leaders alienated him. He was imprisoned, and narrowly escaped the guillotine; his rank and estates were restored to him by Napoleon.

ROCHE, *roach,* WILLIAM JAMES (1860-), a Canadian physician and statesman, a member of the Dominion House of Commons since 1896 and after 1911 a member of the Conservative Borden Ministry. Dr. Roche was born at Clandeboye, Ont., and received his education at the London High School, Trinity Medical College and the University of Toronto. In 1883, after he had been admitted to practice, he removed to Minnedosa, Man., where he practiced medicine for years, and was also for a time a member of the Manitoba medical council. After 1896 he served continuously in the House of Commons. In 1911, on the formation of the Borden Cabinet, he became Secretary of State, and a year later was appointed Minister of the Interior and Superintendent of Indian Affairs.

ROCHEFORT, *rosh fawr',* VICTOR HENRI (1830-1913), a French journalist who repeatedly defied the authorities by his frank expression of radical political views. He was dropped from the editorial staff of the *Figaro* in 1866 because of his spirited attacks on the government of Napoleon III. Two years later he began a weekly paper of his own, *La Lanterne,* the radical policies of which brought him a prison sentence, but he escaped to Brussels. In 1869 he started another paper, *La Marseillaise,* and again was sentenced to prison. On the downfall of the Empire at the close of the Franco-German War (1871) he was pardoned and for a brief period served as a member of the government of national defense. Rochefort's opposition to Thiers, first President of the republic, caused him to be sent to the penal colony of New Caledonia, but in 1874 he escaped, and in 1880 was allowed to return to Paris. Thereafter he continued his career of a radical, liberty-loving journalist.

ROCH'ESTER, MINN., the county seat of Olmsted County, is situated in the southeastern corner of the state and on the Zumbro River, 107 miles southeast of Saint Paul, 346 miles northwest of Chicago and fifty miles west of Winona. Railway transportation is provided by the Chicago Great Western and the Chicago & North Western lines. The city is the headquarters of the Mayo brothers, world-famous surgeons (see MAYO, WILLIAM JAMES AND CHARLES HORACE). Rochester was settled in 1854 and was incorporated as a city in 1858. In 1910 the population was 7,844; Irish, Germans and Scandinavians predominate among the foreign born.

The country surrounding Rochester is a stock-raising and agricultural district which produces large quantities of wheat. The leading industrial plants are flour mills and gristmills; there are, besides, large grain elevators, stockyards and a camera factory. Rochester has a courthouse, a municipal building, Masonic Temple, Odd Fellows' Building, Rochester State Hospital for the Insane, the hospital conducted by the Sisters of Saint Francis (Saint Mary's), the Academy of Our Lady of Lourdes, and a public library.

ROCHESTER, N. Y., the county seat of Monroe County, is in the north-central part of the western extension of New York state, seven miles south of Lake Ontario and seventy-eight miles northeast of Buffalo. It is the third largest city in the state, ranking next to New York and Buffalo, with a population of 218,149 in 1910 and of 256,417 (Federal estimate) in 1916. Rochester has an area of over twenty square miles, almost equally divided by the Genesee River. Within the city limits this river descends 257 feet in falls and rapids. The highest falls, near the center of the city, drop ninety-five feet. From the northernmost bridge of the twelve which span the river within the city limits may be seen a magnificent gorge 200 feet deep, cut by the Genesee.

The Erie Canal crosses the city east and west and is carried over the river by a fine aqueduct costing $600,000. The New York State Barge Canal (which see) is reached by a branch canal five miles long. Railroad service is provided by the Erie, the Lehigh Valley, the New York Central, the Pennsylvania, the West Shore and the Buffalo, Rochester & Pittsburgh lines. The city also has electric-interurban service. The lake port of Rochester is Charlotte, at the

mouth of the Genesee River. Both passenger and freight boats make this port.

Parks and Buildings. Rochester occupies a fine, level site; the city is well planned and has many imposing public buildings. The largest parks are Durand-Eastman (484 acres), on the lake shore; Genesee Valley (538 acres), Seneca and Maplewood, all three along the river, and Highland Park. The city has two noteworthy monuments, one to soldiers and sailors, the second to a native son, Frederick Douglas, the distinguished negro orator. Prominent buildings are the Federal building, erected in 1891 at a cost of $600,000; the courthouse, a fine granite structure; the city hall, Y. M. C. A. building, Chamber of Commerce, state armory, Masonic Temple, Memorial Art Gallery, the public library and East and West high schools.

Institutions. The city has Rochester Theological Seminary (Baptist), Saint Bernard's Seminary (Roman Catholic) and Mechanics Institute. In addition to the public library, the city has the Reynolds and Law libraries. Benevolent, charitable and penal institutions include the General Homeopathic, Hahnemann and Saint Mary's hospitals, the Rochester State Hospital for the Insane, city hospital for contagious diseases, Iola Sanitarium for the treatment of tuberculosis, a large dental clinic, Monroe County almshouse, homes for aged persons and for orphans, and the county jail.

Industries. Rochester was once known as a foremost flour-milling city, the industry developing as a result of the great, natural water power at this place; but milling declined to a place of secondary importance with the development of the wheat fields of the Middle West in the vicinity of Minneapolis and Saint Paul. Other manufactures have proportionately increased, however; Rochester excels in the production of photographic apparatus and supplies, and is among the leading cities of the world in the manufacture of optical instruments, surgical instruments, thermometers, boots and shoes and men's clothing. Other important products are nursery stock, shrubs and seeds, office systems, carbon paper, typewriter ribbon, woodworking and machine-shop products, electrical machinery, telephones and telephone appliances and railway-signaling devices. A local estimate of 1916 reported 326 factories, 10,000 operatives and an annual output valued at $25,000,000.

Rochester was settled in 1812, was incorporated in 1817 and became a city in 1834. The name was given in honor of one of the original landowners, Nathaniel Rochester.

ROCK, the solid portion of the earth's crust. The processes by which rocks were formed are described in these volumes in the article GEOLOGY. The formation of rocks from molten material is still going on, and may be seen wherever active volcanoes throw out lava, which solidifies in cooling. The rock envelope of the earth contains nearly all the known chemical elements, though only eight of them enter into the composition of rocks in such proportions as to require naming them. They are:

	Per cent		Per cent
Oxygen	74.02	Calcium	3.50
Silicon	28.06	Magnesium	2.62
Aluminum	8.16	Sodium	2.63
Iron	4.64	Potassium	2.32

Silicon is the basis of all quartz rock; aluminum is the basis of clay; calcium of limestone; and magnesium of all rocks containing magnesia. Each of these substances is described under its title.

As used in geology, the term *rock* means any solid portion of the earth. Sand and gravel are rock to the geologist. The term *stone* is applied to small, detached portions of rock, though very large masses are usually called *rocks.* Rounded stones which have been shaped by the action of ice or water are called *boulders.* These are frequently found long distances from the mass of rock from which they were broken, having been transported by ice.

According to their formation rocks are classified as *igneous, stratified* and *metamorphic;* according to their composition, as *granite, marble, quartzite, slate,* etc.

Related Subjects. The reader is referred to the following articles in these volumes:

Glacier	Metamorphism
Igneous Rocks	Stratified Rocks

ROCKEFELLER, *rok'e fel er,* an American family name that stands for brilliant achievements in the financial world. Three members of the family—two brothers and a son—are especially noteworthy; the elder brother, John Davison, is known everywhere as the richest man in the world.

John Davison Rockefeller (1839-) was born in Richford, N. Y., and educated in the public schools of that city and in those of Cleveland, O., whither his parents removed in 1853. The extraordinary business talents of the youth were early manifest, for at the age of nineteen he borrowed a thousand dollars and became head of a commission firm of his own—a venture that proved highly successful. Having entered into business connections with

Samuel Andrews, a prosperous oil refiner, in 1862, he organized the firm of Andrews, Clark & Company, beginning then to formulate the policy that was destined to earn him a huge fortune. This policy was the wiping out of competition in the oil field.

JOHN D. ROCKEFELLER

The world's only billionaire. Within recent years he testified in court that he did not know the amount of his wealth, for the reasons that it increased so rapidly and that values of stocks were constantly changing. In 1915 his riches were carefully estimated at over $900,000,000; in 1916, when unprecedented expansion in trade and rise of stock values occurred, owing to war demands for American goods, he became a billionaire.

The firm's name was changed to William Rockefeller & Company in 1865, when a younger brother was taken into partnership, and a new oil refinery, the Standard Oil Works, was built. Subsequent consolidations, involving the annihilation of competition in the oil industry throughout the country, resulted in the organization of the Standard Oil Company, in 1882. Though this gigantic corporation was technically dissolved in 1892, its affairs continued to be managed from a central New York office. Finally, in May, 1911, the United States Supreme Court ordered its complete dissolution on the ground that a combination in restraint of trade existed.

The chief organizer of this mammoth business retired from active labors in 1911, and thereafter devoted the greater part of his time to philanthropic enterprises which he had been developing for many years. In all, Rockefeller has contributed nearly $90,000,000 of his fortune to the public welfare. He has given $43,000,000 to the General Education Board for the purpose of aiding American schools and colleges to maintain high standards; the Southern Education Board has received about $1,126,000, to be used in the South. His gifts to the University of Chicago total over $23,000,000, and Harvard and Yale have each received $1,000,000. To Vassar have been donated a $100,000 building, 3,000 volumes on Greek art and literature and various gifts in money, and to Barnard College a fund of $1,375,000. The Rockefeller Institute for Medical Research, in New York, has been endowed with $1,825,000, and in 1913 the state legislature of New York passed a bill for the incorporation of the Rockefeller Foundation (which see), to control $100,000,000 to be used for the advancement of civilization throughout the world. Many other generous gifts have been made to various colleges, churches and missions. See, also, STANDARD OIL COMPANY.

John Davison Rockefeller Jr. (1874-), son of the founder of the Standard Oil Company, was born in Cleveland. After his graduation from Brown University (1897), he became an associate of his father in business, and became director in various large corporations. Philanthropy and religious work have claimed much of his time and interest; for several years he has taught a Sunday-school class in New York City that has one of the largest enrolments in the world. In 1913 he founded, near New York, an institution for the rescue and assistance of unfortunate women.

JOHN D. ROCKEFELLER, JR.

William Rockefeller (1841-), brother of John D., Sr., was born at Richford, N. Y. After engaging in the produce commission business he associated himself with his brother in oil refining at Cleveland, and between 1865 and 1911 was in charge of the New York business of the Standard Oil Company of New Jersey. He also had a share in the management of various banks and trust companies, railroads, mining corporations and gas and electric companies. B.M.W.

ROCKEFELLER FOUNDA'TION, the greatest philanthropic trust in the history of the world, incorporated in May, 1913, by the New York legislature. The original endowment, consisting of one hundred million dollars, the gift of John D. Rockefeller, was made to provide an income through which the "well-being of mankind" should be promoted throughout the world. In May, 1917, a new donation of $25,000,000 was announced. The numerous activities of the Foundation since its incorporation include the organization of a successful fight against the hookworm disease (see HOOKWORM); the establishment of a medical commission in China to extend medical education in that country and to raise the health standards of the people; the creation of a commit-

tee to study the relations between capital and labor.

The outbreak of the War of the Nations was the occasion for many new acts of mercy. Thousands of dollars were spent in Belgian relief work and in coöperating with the Red Cross Society. America's entrance into the great war was followed by several new donations, including $200,000 to the Rockefeller Institute for Medical Research for the establishment of the Carrel Hospital, where new methods of combating infection of wounds will be studied.

The Institute for Medical Research (see below) has been aided by regular donations amounting to over $2,500,000. Other institutions that are regular beneficiaries of the fund are the American Academy at Rome, the New York Association for Improving the Condition of the Poor, and the organized charity societies of New York and Brooklyn. To Wellesley College has been donated $750,000, and to Johns Hopkins Medical School, $350,000. In 1917 $2,000,000 was appropriated toward the establishment of a huge medical college in connection with the University of Chicago. The governing body of the board is a self-perpetuating body of trustees.

ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH, one of the most important agencies of the present day devoted to the interests of humanity, its special field being the prevention and cure of diseases that afflict mankind. The Rockefeller Institute was incorporated in 1901 in accordance with a pledge made by John D. Rockefeller that he would advance $200,000 to be used in preliminary work in medical research for the interest of "humanity and science." Subsequent gifts have brought the endowment up to $8,240,000, including grounds, buildings and equipment.

The first year's work of the Institute consisted in giving aid to various lines of research already established, but at the second annual meeting of the board of trustees it was decided to unite the most important lines of work in a central laboratory under the direction of a competent head. Dr. Simon Flexner, professor of pathology at the University of Pennsylvania, was chosen director, and in 1904, in New York City, the board began the erection of a splendid building in which to carry on the work of the Institute.

Under the present organization there are maintained departments of pathology, bacteriology, physiological and pathological chemistry, physiology, comparative zoölogy, pharmacology and experimental therapeutics. The Institute coöperates with many other bodies in practical investigation; with the Health Department of New York City it has made a study of the conditions governing the milk supply of that city, particularly with reference to the tenement children; and it has coöperated with various commissions appointed to investigate certain dangerous diseases. A hospital under the direction of the Institute was opened in 1910, where the different diseases that affect mankind are given the closest scientific study.

The records of the work accomplished by the Institute are collected in volumes of *Reprints* and published in numerous scientific magazines. The organization also has the care of the publication of *The Journal of Experimental Medicine.* Though established for research rather than instruction, the Rockefeller Institute is closely connected with the progress of medical education, because of its important discoveries in the field of medicine.

ROCK'ET, a form of fireworks which is sent flying through the air, releasing brilliant stars, clusters of many-colored sparks, or showers of gold and silver rain that are remarkably beautiful.

The *skyrocket* consists of a paper or cardboard cylinder with a pointed head, fastened to a light-weight stick that both balances and guides. There are also *winged rockets,* furnished with cardboard wings instead of a stick. The cylinder is packed with an explosive mixture, except for a hollow bore through the center. Here the heated gases collect when the rocket is fired, forcing their way downward and escaping through a small opening at the lower end. The rapid upward motion is the result of the reaction of the air on this escaping gas. The rocket is like a small cannon, but it is so light and the charge so heavy that the backward pressure exerted through the recoil is much greater in proportion than when a cannon is fired. By the time the body of the cylinder is burned out the rocket has reached its greatest height. The fire is then communicated by a fuse to the pointed head containing the material that, when ignited, produces stars and sparks.

Rockets serve not only for ornamental fireworks, but for signaling, both in the army and in the navy. A signal of distress at sea may be given by firing single rockets at short intervals. The life-saving service likewise employs rockets for carrying life lines, particularly

where great range is needed, or in very rocky places which are dangerous for lifeboats to approach. See FIREWORKS.

ROCKFORD, ILL., a manufacturing and distributing center in the northern part of the state, and the county seat of Winnebago County. It is situated near the northern state line, about midway between its eastern and western borders and on both banks of Rock River. Chicago is eighty-five miles southeast; Dubuque, Iowa, is ninety-five miles west and north; and Beloit, Wis., is eighteen miles directly north. The city is served by the Chicago & North Western, the Illinois Central, the Chicago, Burlington & Quincy, and the Chicago, Milwaukee & Saint Paul railroads. Interurban lines extend north, east and west from the city. Rockford was settled by people from New England in 1834, was plotted in 1836 and became a city in 1852. Swedes predominate among the foreigners, who comprise about one-half of the total population. In 1910 the population was 45,688; in 1916 it was 55,185 (Federal estimate). The area was enlarged considerably by the annexation of suburbs in 1890, and now exceeds nine square miles. The city is one of the largest in Illinois which prohibit the sale of liquors. After the entrance of America into the War of the Nations a large area near the city was selected to be the site of one of the great camps for training the new national army.

Rockford is known locally as the *Forest City,* because of its magnificent old trees. It is a beautiful city, the attractiveness of which is enhanced by the Rock River. This stream also contributes largely to its industrial importance. Several railroad and highway bridges span it at this point, and a dam 800 feet long provides ample power for manufacture. Artesian wells supply drinking water. Rockford has one of the largest plants in the United States for making gas stoves exclusively, and its furniture, harness, saddlery, hosiery and farm-implement factories have high rank among establishments of their kind; about 10,000 men are employed in three of the largest plants.

The important buildings include the Winnebago County courthouse, the city hall, the Federal building, erected at a cost of about $130,000; Rockford Library, the gift of Andrew Carnegie, the Elks' Club, East Side Inn, G. A. R. Memorial Hall, the Y. M. C. A. building, the American Insurance Building, and several bank, business and retail-store buildings. There are forty-three churches, three sanitariums and three hospitals, the most noted being Saint Anthony's Hospital. In addition to the public schools the city has Rockford College for Women, and Our Lady of Perpetual Help and Saint Mary's seminaries. Mandeville House, said to be the oldest house in Winnebago County, is a feature of interest in Mandeville Park.

ROCK ISLAND, ILL., the county seat of Rock Island County and a commercial center of importance in its territory, is situated on the northwestern border of the state, on the Mississippi River at the point where it receives the waters of the Rock River, and on the Hennepin Canal. Chicago is 180 miles slightly northeast, by rail. Railway transportation is provided by the Chicago, Rock Island & Pacific, the Chicago, Burlington & Quincy, the Chicago, Milwaukee & Saint Paul, the Davenport, Rock Island & Northern and the Rock Island & Southern. Steamers connect with all important ports on the Mississippi River, and an electric line operates to adjacent towns north and east through Moline. In 1910 the population was 24,335; in 1916 it was 28,926 (Federal estimate). The area of the city is nearly six square miles.

Rock Island, Davenport and Moline, known locally as the *tri-cities,* are as one community socially and commercially. Rock Island was named for a near-by island in the river (sometimes called Government Island) and is connected with Davenport on the opposite bank by a bridge across the island, which was constructed by the United States government at a cost of $1,000,000. Other bridges connect Moline with the island, and the city of Rock Island directly with Davenport. On the island, which is three miles long and composed largely of limestone, the United States government, at an expense of about $10,000,000, has erected an arsenal and armory covering nearly 1,000 acres and employing about 2,500 men.

The Federal government has also constructed a dam here, which furnishes immense water power to the tri-cities, and has largely contributed to the development of this important manufacturing center. Rock Island is noted primarily for making agricultural implements, but the output of stoves, building materials, plumbing specialties, oilcloth and carriages is extensive; the railway car shops here employ about 500 men. The principal buildings are the arsenal buildings, a $175,000 courthouse, Saint Anthony's Hospital and some fine office

buildings. Besides the public schools, with a fine high school which cost $125,000, the city has Augustana College, Visitation Academy and an excellent public library.

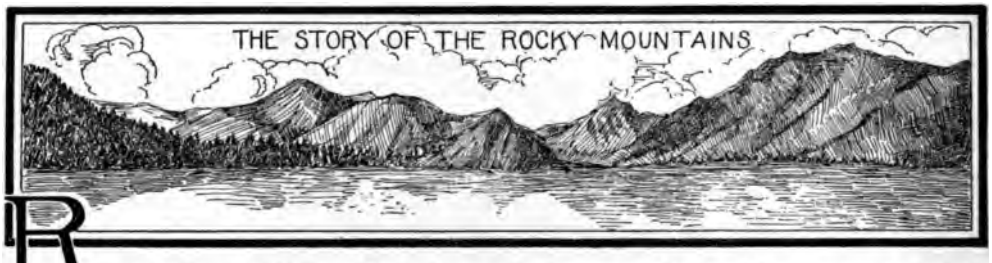
In 1816, Colonel George Davenport established Fort Armstrong on the site of Rock Island, and in 1826 he made the first settlement. It was organized as Stephenson in 1835, and in 1841 it was consolidated with Farnhamesburgh, under the present name. In 1849 it was incorporated as a city and is now governed on the commission plan. In 1916 the tri-cities celebrated the hundredth anniversary of the establishment of Fort Armstrong.

ROCKLAND, a town in Russell County, Ontario. It is on the Ottawa River, and on the Grand Trunk and Canadian Northern railways, twenty-three miles by rail east of the city of Ottawa. It has some manufacturing interest, including a mica factory, sash-and-door factory, lumber and planing mills, but it is best known as a summer resort. Population in 1911, 3,397; in 1916, 3,700.

ROCK RIVER, a river about 325 miles long, which rises in the southern-central part of Wisconsin, flows southwest and joins the Mississippi near the city of Rock Island, Ill. Because of swift rapids it is of no importance to navigation, but furnishes excellent water power to the cities situated on its banks. Among these are Watertown, Janesville and Beloit, in Wisconsin, and Rockford, Sterling and Dixon, in Illinois. The country through which the river flows contains much picturesque scenery. At Janesville there is a huge rock jutting into the water, on which Black Hawk is said to have made his last speech to the Indians (see BLACK HAWK).

ROCK SALT. See SALT.

ROCKY MOUNT, N. C., a commercial center in the northeastern part of the state, situated on the dividing line between Edgecomb and Nash counties, and on the Tar River. It is sixty-eight miles northeast of Raleigh, the state capital, and 124 miles north of Wilmington, by the Atlantic Coast Line Railway. Rocky Mount is a tobacco and cotton market, and its chief manufactures depend on these products. Besides hosiery and tobacco factories and lumber mills, it has the large machine and repair shops of the Atlantic Coast Line. The city has a Federal building, erected in 1905 at a cost of $100,000, a high school, a business school and three hospitals. In 1910 the population was 8,051; it had increased to 12,067 (Federal estimate) by 1916. G.K.H.



ROCKY MOUNTAINS. Most of us, when we think of the Rocky Mountains, picture to ourselves the whole western edge of North America, from the point where the first peaks tower above the Great Plains to the abrupt shores of the Pacific. We may, also, consider the Rockies as the North American half of the Cordilleran chain, which extends from Cape Horn to the Arctic Circle, and of which the Andes form the South American half. But geographers, when they refer to them, include in the Rocky Mountains only the easternmost range of the northern Cordilleras, the wall of granite which begins near Vera Cruz in Mexico and passes north and west through Texas, New Mexico, Colorado, Utah, Wyoming, Idaho, Montana, Alberta, British Columbia and the Yukon to Alaska. They do not include the western Sierra Madre in Mexico, the Sierra Nevada, Cascade and Coast ranges in the United States, nor the Coast, Gold and Selkirk mountains in Canada.

In Mexico. At their southern end the Rocky Mountains touch the eastern coast of the continent, their steep slopes rising almost directly out of the Gulf of Mexico. Here in the tropics is the tallest peak in all the Rockies, the snow-tipped cone of Orizaba, whose summit is more than 18,000 feet above the near-by sea. North of it the range marks the eastern boundary of the great Mexican plateau; it is low, and is broken in many places.

In the United States. The engineers of the first railroad to the Pacific, searching for a

place where they could carry their tracks across the Rockies without encountering heavy grades, found in the southern part of Wyoming a plateau over 250 miles long and 100 miles wide running through the mountains from east to west at a height of 7,000 feet. This plateau, called the Laramie Plains, divides the Rockies of the United States into two distinct parts. To the south of it comes first the highest and broadest section in the whole Rocky Mountains system, covering Colorado and Eastern Utah; then come the lower and less compact ranges of New Mexico and Texas. In Colorado alone there are almost fifty peaks over 14,000 feet high; in Utah and New Mexico ten exceed 13,000 feet, and in Texas one mountain, El Capitan, is 9,020 feet in height. Above the Laramie Plains the Rockies extend toward the northwest, and are narrower and slightly lower. Wyoming has half a dozen peaks more than 13,000 feet high, but Idaho and Montana have each only one summit above 12,000 feet.

The Canadian Rockies. Sometimes people who have never before seen mountains exclaim with disappointment, after passing through the Rockies, that mountains were not at all what they had expected. Such a feeling is aroused by the fact that usually where the tallest peaks are, there also are the highest plains and plateaus. If these plains surround a mountain at half its height, its visible mass is only about one-eighth as great as if it rose directly out of the sea. In the Canadian mountains travelers find all their dreams of the Rockies fulfilled. There are dozens of peaks more than 11,000 feet high, several more than 12,000 and one, Mount Robson, over 13,000 feet high, yet the Canadian Pacific Railway crosses the continental divide at an altitude of only 5,332 feet and the Grand Trunk Pacific and Canadian Northern, when at their highest points, near the foot of Mount Robson, are only 3,726 and 3,712 feet above the sea. The principal peaks of the Canadian Rockies are in British Columbia, and toward the north the range gradually decreases in height until at the Arctic Circle it is only a series of hills.

What Made the Rockies. The Rocky Mountains are too long a chain to be alike throughout their length. In general, of course, their existence is due to pressure from east and west by the mighty forces of nature, which has lifted to this continental backbone rocks containing skeletons of animals that once lived in the sea, and other rocks formed by the intense heat of the earth's interior. In the southern half some of the mountains were once volcanoes, and evidences of volcanic activity are found in the huge lava sheets of Montana and Idaho and the geysers of Yellowstone National Park. But the shape of the Rockies as we now see them is the work of nature's never-resting carvers, the wind, the rain and, from Colorado northward, the glacier. It is they that have hollowed out the valleys and worn away the softer layers of rock, revealing to geologists the history of the mountains and exposing to prospectors and miners rich treasures in gold, silver, copper and coal. C.H.H.

Consult Parkman's *The Oregon Trail;* Hornaday's *Campfires in the Canadian Rockies;* Johnson's *Highways and Byways of the Rocky Mountains.*

ROCKY MOUNTAINS PARK, in Alberta, a national playground for the Canadian people. The park, covering an area of about 2,000 square miles, lies on the eastern slope of the Rockies. It was set aside as a reservation by Act of Parliament in 1887, the first Dominion park. In 1911 Parliament provided for the reservation of a larger area, the Rocky Mountains Forest Reserve, of which the old park became a part for some purposes, although it still retains its identity as a national park. The new reserve, covering an area of 20,896 square miles (13,373,000 acres), extends northward from the United States boundary for a distance of 500 miles, and is from twelve to one hundred miles wide. It covers an area about as large as the province of Nova Scotia, or about one-twelfth of the entire province of Alberta. In this vast territory animal and plant life is protected. Firearms are prohibited, and visitors must conduct themselves so that the peace of the park is not disturbed.

The heart of the Rocky Mountains Forest Reserve is Rocky Mountains Park. Here are many of the loveliest spots in all the world. The Dominion government and the Canadian Pacific Railway have combined to make these spots easily accessible and yet have not destroyed their charm. The park is under the control of a superintendent, who is responsible to the chief of the Dominion Parks Branch of the Department of the Interior.

Banff, "Capital" of the Park. To thousands of visitors, and to many thousands more who have heard of its wonders, the park means Banff. This little settlement, which exists for the benefit of tourists, is the extrance to the park. Here the visitor may recline luxuriously on a hotel veranda, overlooking the valleys of

the Bow and the Spray rivers. Within easy reach are gentle climbs and gorgeous vistas, as well as challenging peaks which will try the nerve of the most experienced Alpine climber. From Banff, either afoot or with horses, the tourist may visit dozens of interesting and attractive spots.

At Banff, near the junction of the Bow and the Spray, are the pretty Bow Falls. Here the banks of the Bow are fringed with superb trees, whose green is heightened by the dark mass of Mount Edith, beyond them. Mount Edith is 9,154 feet high, and is a fair test of the climbing ability of an Alpinist. South of the Spray and west of the Bow is Rundle Mountain, 9,798 feet high, whose precipitous eastern slope is one of the striking features of the landscape. Another pretty elevation is Sulphur Mountain, the culmination of a long, wooded ridge north of Banff. It takes its name from the hot sulphur springs on its slope. A short distance below the springs is the club house of the Canadian Alpine Club, and on the summit is a little observatory from which a beautiful bird's-eye view may be obtained.

There are many other points to see at Banff. There is Buffalo Park, in which buffalo, elk and moose may be seen living practically in their natural state. There are beautiful drives up the Spray valley, past old lumber camps and through forests to the Spray Canyon. Another drive goes to the Sun Dance Canyon. There are lovely lakes—the Spray lakes, the Sawback lakes, Vermilion and Minnewanka. Minnewanka is very deep and walled in by high cliffs. Trout fishing is best in the Sawbacks, but there is good sport on all of them. The Cave and Basin, about a mile from Banff, are a remarkable rock formation from which gush natural sulphur springs; there the Canadian government has built a fine swimming pool. Near by are the Hoodoos, strange, fantastic masses of rock, somewhat like those in the Garden of the Gods in Colorado.

Lake Louise. Although Banff is the entrance to the Rocky Mountains Park, it must divide honors for beauty with Lake Louise, "the Pearl of the Rockies," which lies in the western part of the park, near the British Columbia boundary. Not only is Lake Louise beautiful, but on all sides are landscapes of unforgetable grandeur. Exquisite coloring, always changing, somber forests and gleaming glaciers, sullen rocky slopes and bright, snow-capped peaks, all together are mirrored in the waters of the lake. See LOUISE, LAKE; PARKS, NATIONAL. W.F.Z.

ROCKY MOUNTAIN WHITE GOAT, a habitant of the high summits of the American and Canadian Rockies, belonging to the goat antelope family. It has a pure white, silky coat, small black hoofs, and slender black horns which curve backwards, and it is about three feet high at the shoulders. The animal lives for the most part high above the timber line,

ROCKY MOUNTAIN WHITE GOAT

midst snow and glaciers, where its white coat is an excellent means of protection. It feeds on the grasses that are found along the edges of the glaciers. Hunters often track these goats by following their trails, for they usually keep to the trodden paths. Not only is their flesh palatable, but their skins are valued for making rugs.

RO'DENTS, or **RODENTIA,** *ro den' shi a,* an order of mammals whose distinguishing characteristic is the possession of teeth especially adapted for gnawing. These teeth are large, curved, deeply rooted incisors, and there is one pair in the front of each jaw. They are peculiar in that they grow continuously from the roots, but wear away at the tips; as the front surfaces alone are protected by enamel, the teeth wear faster at the back, and so a sharp, chisel-like edge is developed. For this reason these animals can gnaw through very hard substances. Canine teeth are totally absent. Rodentia show considerable variation in size; the smallest rodent is the mouse, and the largest the capybara, a South American aquatic animal that grows to be four feet long. In habits there is even greater variety, for some live in burrows, as gophers, prairie dogs and marmots; some have nests in the woodlands and meadows, as field mice; some live in trees, as squir-

rels; and the muskrats and beavers can live in water. One species of squirrel can fly. Most rodents are covered with fur, but the porcupine has a covering that is truly a "coat of mail," for mingled with the coarse hairs on its back and sides are numerous stiff, barbed spines. Rodents are found in practically all parts of the world, and they constitute the largest order of mammals.

Consult Gregory's *The Order of Mammals;* Osborn's *The Age of Mammals.*

Related Subjects. The most important of these animals are described in these volumes. A list follows:

Agouti	Hedgehog
Bandicoot	Jerboa
Beaver	Lemming
Chinchilla	Marmot
Chipmunk	Mouse
Deer Mouse	Muskrat
Dormouse	Pika
Flying Squirrel	Porcupine
Gopher	Prairie Dog
Ground Hog	Rabbit
Guinea Pig	Rat
Hamster	Squirrel
Hare	Vole

RODIN, *ro daN',* AUGUSTE (1840-), the greatest French sculptor of his age. His theory that nature should be the artist's one source of inspiration, and that only those creations which possess no character are ugly in art, has been consistently applied throughout his career. Rodin was born in Paris, and in that city received all of his not very extended schooling. His genius flowered early, as one of his finest pieces, a head entitled *Broken Nose,* was modeled when he was only twenty-two. For several years after the Franco-German War, during which he was a member of the National Guard, he worked and studied in Brussels.

Rodin's famous *Age of Bronze,* which created a sensation because of its daring realism, was exhibited in 1877 in the Paris Salon. Then followed a bust of Saint John (now in the Metropolitan Museum, New York), *Saint John Preaching, The Thinker* (see accompanying illustration), *Adam and Eve* (also in the Metropolitan), the monument to the six *Bourgeois de Calais, The Kiss,* the *Danaid,* the *Bather* (Metropolitan) and many other works, including busts of several noted men. In 1914, when the war in Europe broke out, Rodin's studio, the Hôtel Biron, was taken over by the government and converted into a day nursery. The aged sculptor, finding no haven in troubled France for creative work, went over to London. As a token of his appreciation of the kind welcome accorded him by the English people, he presented to the Museum of Victoria and Albert eighteen of his finest pieces of sculpture.

Consult Mauclair's *Auguste Rodin* (translation by Black).

"THE THINKER"
One of the most remarkable of modern works of art.

ROE, *ro,* EDWARD PAYSON (1838-1888), an American novelist and clergyman, born in Orange County, N. Y. He was educated at Williams College and at Auburn and Union Theological seminaries, served as a chaplain during the War of Secession, and then held the Presbyterian pastorate at Highland Falls, N. Y. Resigning this, he moved to Cornwall-on-Hudson, where he devoted himself to lecturing, writing and fruit culture. He wrote a long series of stories, of which great numbers were sold. They were almost as popular in England as in America, and some were translated into German. However, none of them possesses any special literary merit, and all follow the same traditional form of the novel. *The Opening of a Chestnut Burr* was probably the most popular. *Barriers Burned Away* has its climax in the great Chicago fire, and *The Earth Trembled* contains a description of scenes in Charleston, S. C., during the earthquakes of 1886. *He Fell*

in Love with His Wife is another of his best-known stories.

ROEBUCK, *ro'buk,* also called ROE DEER and ROE, a European member of the deer family, one of the smallest of that race. It is a graceful, agile animal, with a long neck, slender legs and a very short tail. Its summer coat is fox-red above and white beneath, but in winter this changes to a grayish-fawn color, with a white mark on the rump. The male is about twenty-seven inches high at the shoulder, and has upright antlers with two main forks. Roe deer are still found wild in sparsely-settled regions in the temperate parts of Europe, but are far less abundant than formerly. Both males and females are called *roes.*

THE ROEBUCK

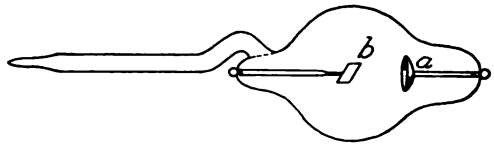
ROENTGEN, *runt'gen,* WILHELM KONRAD (1845-), a German physicist and inventor, born at Lennep, Prussia. He studied at Zurich and Utrecht, became assistant professor at Strassburg in 1873, and was then professor successively at Hohenheim, Giessem, Würzburg and Munich. His fame rests on his discovery at Würzburg, in 1895, of Roentgen rays (which see), commonly known as X-rays, which have practically revolutionized surgery. For this discovery he was given the Order of the Royal Crown by the German emperor and the title of baron by Prince Ludwig of Bavaria. In 1900 Columbia University awarded him the Barnard Medal for the greatest discovery in science during the preceding five years. He was also awarded the Rumford Medal of the Royal Society of London.

ROENTGEN RAYS, or **X-RAYS,** the name given a peculiar radiation discovered in 1895 by Professor Wilhelm Roentgen, of the University of Würzburg, while he was experimenting with Crookes tubes. Roentgen gave the name X-rays to these radiations because he did not understand their mechanism. They were afterwards named *Roentgen* rays, in honor of the discoverer.

The apparatus for producing Roentgen rays consists of a glass bulb in which nearly a perfect vacuum has been produced, and having a concave cathode (negative) metallic plate (*a* in illustration) and a flat platinum anode (positive) plate (*b*) placed at the focus of the concave plate and inclined to it at an angle of 45°. When a strong electric current is passed through the bulb the cathode rays fall upon the platinum plate, and from this plate the Roentgen rays pass through the walls of the bulb.

X-rays are invisible, and can be detected only by their effects. They are not reflected, refracted or polarized like ordinary rays of light. They possess the remarkable power of passing through many substances that are opaque to light rays, and of being absorbed by certain transparent substances. They will not, for instance, pass through glass, but will pass through muscular tissue. For this reason their discovery has revolutionized surgery. Compounds of borium, calcium and platinum become self-luminous when exposed to X-rays, and if an object opaque to these rays is placed between a screen coated with one of these substances and an X-ray tube, its shadow will appear on the screen. Since the bones absorb more of the rays than the flesh the shadow of the hand thrown upon the screen shows the bones.

Uses of X-Rays. An X-ray photograph is made by laying the object on the sensitized surface of a photographic plate and exposing the plate to the rays. Surgeons make use of



X-rays for locating foreign objects, such as needles and bullets, that have penetrated the body, and for determining the character of fractures and dislocations. X-rays are also employed in the treatment of certain forms of cancer. Sometimes physicians employ X-ray apparatus for observing the beating of the heart. When the skin is exposed too long to the rays they produce an effect similar to a burn. The apparatus should therefore be used only by experienced operators.

Consult Williams' *The Roentgen Rays in Medicine and Surgery;* Thompson's *Light, Visible and Invisible;* Bragg's *X-Rays: How to Produce and Interpret Them.*

Related Subjects. The reader is referred to the following articles in these volumes:

Cancer
Cathode Rays
Crookes Tubes
Roentgen, Wilhelm Konrad

ROGATION, *ro ga'shun,* **DAYS,** in the Roman Catholic Church, the Monday, Tuesday and Wednesday before Ascension Day (which see). On these days prayers known as the *litanies* are appointed to be sung or recited by the priests and people in public procession. The week in which the days occur is sometimes called *Rogation Week.* The name comes from the Latin *rogare,* meaning *to ask,* and the equivalent Greek word means *litany.* See LITANY.

ROGERS, *roj'erz,* JOHN (1829-1904), an American sculptor who became widely known for his clay models of groups representing typical scenes in American life and history. Of his many popular statuettes none is a greater favorite than his *John Alden and Priscilla.* The reader will find a reproduction of this attractive piece of work on page 1616, in connection with the article COURTSHIP OF MILES STANDISH. Other popular figures are his *Charity Patient, Going for the Cows* and *The Town Pump.* Rogers was born at Salem, Mass. His art studies were pursued in Rome and in Paris, and his first work of importance was the *Slave Auction,* exhibited in America in 1860. Several war groups followed, including the *Picket Guard* and *Union Refugees.* In some of his historical statuettes will be found portrait studies of Lincoln, Grant, Whittier and other famous men. Many of his clay figures have been copied in bronze, and he used this metal for his more elaborate figures, notably an equestrian statue of General Reynolds, in front of the Philadelphia city hall. The Metropolitan Museum possesses several good examples of his groups in bronze.

ROGERS, RANDOLPH (1825-1892), an American sculptor, famed for his memorial and symbolic monuments. He designed and modeled the bronze doors for the Capitol at Washington, which illustrate the life of Columbus, and he executed a great statue of Lincoln for Philadelphia, a statue of the *Genius of Connecticut* for Hartford, a colossal *America* for Providence, R. I., a figure representing the state of Michigan for Detroit, and the figures of Marshall, Mason and Nelson for the Richmond (Va.) Washington Monument. His *Nydia, the Blind Girl of Pompeii* (Art Institute, Chicago) and the *Boy with Dog* won him wide popularity. Rogers was born at Waterloo, N. Y., but passed his boyhood in Ann Arbor, Mich. He studied art in Rome under Bartolini and other sculptors, and from 1885 until his death he lived in Italy. The University of Michigan possesses a complete collection of casts of his works.

ROGERS, ROBERT (1864-), a Canadian statesman, after 1912 Dominion Minister of Public Works. He was born at Lakefield, Que., and was educated at Lachute Academy and at Montreal. In 1881 he went to the Northwest, and for some years made his home at Charlevoix, Man. He prospered as a grain dealer, and later became interested in mines and various industrial enterprises. Taking active part in the affairs of the Conservative party, he was president of the party's provincial convention in 1891, and in 1896 was an unsuccessful candidate for the House of Commons. From 1899 to 1911 he sat in the Manitoba provincial assembly, from 1900 to 1911 also serving in the Roblin Ministry, first without portfolio and later as minister of public works. In 1911 his activities were transferred to a new field, for he was appointed Dominion Minister of the Interior and was elected to the House of Commons. A year later he became Minister of Public Works, a position for which his long experience in the Manitoba government made him especially qualified.

ROHLFS, *rohlfs,* ANNA KATHARINE GREEN (1846-), an American novelist, born at Brooklyn, N. Y. While she was still an infant her family moved to Buffalo, N. Y., and there and in Ripley Female College, Poultney, Vt., she was educated. Her short stories began to appear in magazines while she was still a schoolgirl, and her first novel, *The Leavenworth Case,* was published when she was twenty-two years old. This book is a detective story, very much on the order of the famous Sherlock Holmes stories of Conan Doyle, and is still admired for the ingenuity of its plot and for the ability with which a case is established against a criminal by bits of insignificant circumstantial evidence. The author married an actor, Charles Rohlfs, in 1884, and soon after their marriage her husband turned the novel into a drama and produced it with great success. Other of the more important books by Mrs. Rohlfs, all of the detective order, yet wholesome in their influence, are *The Sword of Damocles, Marked "Personal," The Millionaire Baby, The Woman in the Alcove, The House of Whispering Pines, The Mayor's Wife, Three Thousand Dollars* and the *Golden Slipper and Other Problems for Violet Strange.* These stories are filled with dramatic incidents, and this characteristic, together with their well-woven plots, has made those which have been dramatized even more successful on the stage than was *The Leavenworth Case.*

ROHLFS, FRIEDRICH GERHARD (1831-1896), an explorer and writer, born at Vegesack, near Bremen, Germany. He was educated in the medical departments of the universities of Heidelberg, Würzburg and Göttingen. Between his school and university courses he had served with distinction in the German army; therefore, when Rohlfs became an explorer of Africa in 1860, he entered the work with a reputation for ability, bravery and endurance. During his travels in Morocco he so thoroughly mastered the Arabic language that he was able to pass himself as a Mussulman and thus easily investigated the whole country. He explored the Sahara Desert, visited the then almost unknown section of Tafilet, Africa, afterwards passed on to Murzuk, in the interior, and again across the Sahara to Bornu. Many times he traveled in Africa where no white man had been before. In 1868 he explored Abyssinia and brought back valuable maps of the country.

He married in 1870 and tried to lead a domestic life, but the longing for adventure was so strong that in 1873 he returned to Africa to explore the Libyan Desert. During the next twelve years he led other parties into the Sahara Desert and Abyssinia, and had several thrilling escapes from the savage natives. In 1885 Bismarck appointed him consul at Zanzibar, in the hope of strengthening Germany's claim to the island; but the explorer was not trained in diplomacy and was soon recalled. His last days were spent near Bonn, Germany. Among his books which have been of value in geographical study should be mentioned *Travels in Morocco, Land and People of Africa* and *Travels in Tripoli.*

ROJESTVENSKY, *ro jest ven' ski,* SINOVI PETROVICH (1848-), a Russian naval officer, commander of the Baltic fleet which, during the Russo-Japanese War, was defeated in the great Battle of the Sea of Japan by the Japanese on May 27 and 28, 1905. He fought in the Russo-Turkish War of 1877-1878, and took part in the Chino-Japanese War (1894) as second in command to General Alexieff. He was made rear-admiral in 1902, and was given command of the Baltic fleet two years later. In October, 1904, while conducting this fleet to Vladivostok, during the Russo-Japanese War, he incurred the wrath of England by firing on some British fishermen on the Dogger Bank in the North Sea, whom he mistook for the enemy. As a result of the incident Russia was for several days on the verge of war with England. The Japanese commander, Togo, prudently awaited the Russian fleet in home waters, and on May 27 a great naval battle began near the Tsushima Islands, in the Sea of Japan. In a two-days' fight nearly the whole Russian fleet was captured or sunk. Rojestvensky was wounded but was rescued, and over 4,000 of his men were captured by the Japanese.

ROLAND, a celebrated hero of French romances of chivalry, known in Italian romances as *Orlando.* According to the generally accepted legend he was the nephew of Charlemagne, in whose army he fought against the Saracens in Spain. When the army crossed the Pyrenees into France, Roland remained behind with the rear guard, and at Roncesvalles was set upon by the Saracens, defeated and killed. His friend Oliver besought him in the early stages of the battle to blow a blast upon his horn and bring the forces of Charlemagne to his aid, but he refused; and only with his last breath did he sound the call. Charlemagne heard it, turned back, and overthrew the Saracens. The *Song of Roland,* in which this story is told, dates from the eleventh century and ranks as a masterpiece. It was translated into English, German, Italian, Norse and other languages, and formed the basis of many tales.

ROLAND DE LA PLATIÈRE, *ro lahN' deh la pla tyair',* MADAME (MANON JEANNE PHILIPON) (1754-1793), a Frenchwoman who became very prominent during the early years of the French Revolution. She was born in Paris, and in a convent there was given the beginnings of an education. Her real education came, however, from her reading after she left school. In 1781 she was married to Jean Marie Roland de la Platière, and from the first she exercised a strong influence in his affairs. After the outbreak of the Revolution they removed from Lyons to Paris, where their home became the meeting place for many of the leaders of the popular party. In 1792 Roland became minister of the interior, and much that was excellent in the administration of his office he owed to his wife.

MADAME ROLAND

When the downfall of the Girondists came, Madame Roland continued to uphold their cause, but in June, 1793, was arrested and thrown into prison, where she spent the time in writing the *Mémoires* on which her fame rests. In November she was executed, and before laying her head on the block she bowed to the statue of liberty which had been set up near the guillotine and exclaimed, "O Liberty! what crimes are committed in thy name!" When her husband, who had escaped to Rouen, heard of her death he committed suicide.

Consult Taylor's *Life of Madame Roland;* Dobson's *Four French Women.*

ROLFE, *rolf,* JOHN, one of the first English settlers in America, celebrated in Virginia history as the first white man to raise tobacco, and later as the husband of the famous Indian princess, Pocahontas. He landed in Virginia in 1610, and when Captain Argall, the unscrupulous deputy-governor of Virginia, held Pocahontas as hostage for the purpose of extorting such terms from her father as he required, Rolfe married her in the presence of her uncle and two brothers. This event freed the colony from the enmity of Powhatan and preserved peace between the whites and Indians. A son was born of the marriage. After the death of Pocahontas in England, in 1617, Rolfe returned to the colony and took an active part in its affairs. See POCAHONTAS.

ROLL'ING MILL, a mechanical appliance for rolling iron or steel into ingots, bars, rails and plates for use by boiler makers, bridge builders, platers and for general and railroad constructional work. The mill contains a series of rollers in pairs, through which the metal is passed and rolled or pressed into the required shape. The rollers, made of steel, are mounted on frames capable of resisting enormous strain and are driven by high-power horizontal, reversible engines. According to the purpose for which the rolled metal is intended, the rollers are grooved or flat surfaced. The rollers are geared to each other by cogwheels, and each machine is fitted with devices for feeding and guiding the metal as it passes through the rollers.

The use of rollers is universally found necessary, even in the case of cast steel, which in casting acquires certain weaknesses, such as blowholes, caused by the gases generated. The rolling process does away with blowholes, and it strengthens and makes the finished product homogeneous. If plates are required, white hot steel is inserted between two rollers, revolving in opposite directions. The result is a broad, flat sheet which is rolled until the required thickness is reached. For making rods, the rollers are grooved to the required shape. Armor-plate rolling mills are specially designed for massive work; the rollers are from ten to fourteen feet long and from three to four feet in diameter.

For rolling rails, one of the most important functions of rolling mills, the rolls are grooved to produce the rails ready for use. The metal is raised to white heat and then conveyed to the rollers, through which it is passed seven times. It is thus reduced to the form of ingots or bars, about fifteen feet long and nine inches square in section, which are later *sheared* into two or three pieces according to the desired size for the finished rail. These pieces, or *blooms,* are again heated and then passed through the rail mill, consisting of three sets of rollers. The first, or *roughing,* rolls receive the blooms one after another, and roll them into approximately the form of rails. After being passed through the roughing mills five times, the rails pass five times through the *intermediate* rolls, from which they are transferred to the *finishing* rolls. A mill with three sets of rolls is known as a "three-high;" if the intermediate rollers are omitted, it is a "two-high." After they come from the finishing rolls, the rails are cut into sections of thirty or sixty feet, as desired, and are lastly put through the *camber* rolls. Cambering gives them a convexity just enough to assure straightness when they cool. From the time the cast ingot leaves the steel mill until the finished rail is ready for shipment it is not touched by human hands; it is handled only by machinery. W.F.Z.

ROMAN CATHOLIC CHURCH, that body of Christians which accepts the Pope as its head on earth and looks upon him as the representative of Christ and as the successor in direct line of Saint Peter. It believes that the special powers delegated by Christ to the chief of the Apostles have descended to the Pope, and that he is therefore in matters of religion infallible. Any decree concerning faith or morals promulgated by the Pope, or by the Pope and the bishops in council, is held to be of necessity free from error; for Roman Catholics believe that by special protection of the Holy Spirit their Church has kept unchanged the doctrines laid down by Christ, and that it is impossible for errors to creep into the official teachings of the Church.

Doctrines and Sacraments. The doctrines or beliefs of the Roman Catholic Church are set

forth in the Apostles' Creed and its variants, the Nicene Creed, the Athanasian Creed, and the Creed of Constantinople. The most minute statement of the doctrines, constituting a summary of the other creeds, is that issued by Pius IV in the sixteenth century, after the Council of Trent.

The sacraments of the Church, which are of the utmost importance because they are believed by all Roman Catholics to have been instituted directly by Christ, are seven in number. Three of them, the first, second and sixth in the list below, are administered only once to an individual, because they are believed to make so definite and lasting an impression on the soul that repetition is unnecessary.

1. *Baptism.* This is administered to infants as well as to adults. In the former case it is held to wash away the original sin and to effect the sonship of the child with God by the infusion of sanctifying grace; in the case of adults it moreover washes away all sins previously committed.

2. *Confirmation.* This confirms the graces of baptism, and is held to bestow the Holy Ghost.

3. *Holy Eucharist.* This is a sacrament which, it is held, truly and substantially contains body, blood, soul and divinity of our Lord Jesus Christ under the species of bread and wine. It is brought into existence by the consecration at Holy Mass where bread and wine are substantially changed into the living body and blood of our Lord. It continues to exist as the adorable "Blessed sacrament" as long as the appearances remain, and is thus preserved in the tabernacle of the altar. It becomes the nourishment of the faithful in Holy Communion. It was instituted by Jesus Christ at the "Last Supper" on the eve of His passion. A precept of the Church obliges every Catholic who has attained the use of reason to partake of this sacrament in Holy Communion at least once a year at Paschal time. More frequent, even daily communion is counseled by the best theologians and the authorities of the Church themselves.

4. *Penance.* This consists of three stages: sorrow for sin and a determination to amend; confession or accusation of one's self to a priest, who is vowed to eternal secrecy; and the acceptance of certain penitential acts which are imposed by the priest. The penitent being duly disposed the priest may pronounce absolution (which see).

5. *Extreme Unction.* As the other sacraments give help in the various affairs of life, so this is believed to impart grace and strength to meet without flinching the bodily and spiritual struggle of the dying hour. It is held to destroy certain effects of sin, sometimes even sin itself.

6. *Holy Orders.* By this sacrament the clergy are differentiated from the laity, and are admitted into the definite service of Christ, receiving at the same time the spiritual powers requisite for the exercise of their respective orders.

7. *Marriage.* According to the Roman Catholic Church, marriage is a sacrament instituted by Jesus Christ to sanctify the lawful union of man and woman and to give them the graces necessary for their state. This bond cannot be dissolved except by reason of some nullifying circumstances which existed when the sacrament was attempted. Separation may be granted on account of circumstances occurring after the marriage, but not dissolution.

Further Beliefs and Ceremonies. The most sacred and solemn liturgical function of the Church is the Mass, which is believed to be the commemoration, continuation and consummation of the Sacrifice of the Cross (see MASS).

An outstanding feature of the Church is its belief in purgatory, a place of purification after death. If a man dies penitent, but has not been fully cleansed from sin, he may, according to this doctrine, make atonement in purgatory for his sins, and may then be admitted to heaven.

All the saints of the Church are honored, but a special veneration is given to Mary, the mother of Christ, who can, the Roman Catholic believes, obtain for him many spiritual blessings by her intercession. Other saints, especially Joseph, the husband of Mary, may also intercede, but are not so powerful.

A Catholic has laid upon him six ecclesiastical precepts of especial force. He must:

1. Hear Mass on Sunday and holy days.
2. Receive Communion at the Easter time.
3. Observe certain fast days and days of abstinence.
4. Make confession to a priest at least once a year.
5. Contribute to the support of the Church according to his means.
6. Refrain from contracting marriage within the forbidden degrees of kindred, or privately, and from solemnizing marriage at certain times of the year.

The Priesthood. The Church believes in a body of priests who stand as mediators between God and man, performing especially the function of offering sacrifice for the living and the dead. These mediators are set aside by the bishops, who stand as the direct successors of the Apostles. Of its priesthood the Church exacts celibacy, holding that an unmarried clergy may serve God with more freedom and with undivided heart. The law requiring celibacy is for purposes of discipline only, and has nothing to do with the doctrines of the Church. Indeed, there is nothing in the doctrines which demands that the Church impose this obligation.

History. This Church is the earliest of Christian organizations, and when, after three centuries of bitter persecution, it was given free-

dom by the edict of Constantine and Licinius (Milan, 313) it acquired an immense influence. Bishoprics were established in various parts of the Empire, but the one at Rome remained supreme, and in time the title of *Pope,* or *father,* originally borne by all the bishops indiscriminately, began to be restricted to the bishop of Rome. In 1073 its use by any other bishop was formally forbidden.

During the Middle Ages the Church wielded secular as well as religious domination, and at times held considerable territories, but the civil rulers never looked with favor upon this feature of the Church's activities, and long and fierce struggles were waged with the Holy Roman emperors for supremacy. Sometimes one party, sometimes another, was in the ascendancy, and it was not until the Concordat of Worms (1122) that the spiritual and temporal powers of either claimant were strictly defined. With the establishment of the modern kingdom of Italy in the nineteenth century the Church was shorn of its secular powers (see ITALY, subtitle *History;* POPE).

Meantime, however, the Church had endured two severe blows. In the ninth century there began that schism within the body which resulted two centuries later in the formal establishment of the Greek Church; and in the sixteenth century the Protestant Reformation was the cause of another division. These movements, however, did not permanently affect the vigor of the Church, which is to-day as great as it ever was.

Statistics. The Roman Catholic Church has more members throughout the world than any other church. Its total followers are estimated at more than 272,800,000, of whom about two-thirds live in Europe. In 1915 there were in the United States about 16,309,000 Roman Catholics, while Canada, according to its 1911 census, had 2,833,041. G.W.M.

Consult Fitzgerald's *Fifty Years of Catholic Life and Progress;* Carroll's *Religious Forces in the United States.*

Related Subjects. The numerous topics in these volumes which relate to the forms or the beliefs of the Roman Catholic Church are as follows:

Abbot
Absolution
Altar
Antipope
Archbishop
Ave Maria
Benedictines
Bishop
Breviary
Bull
Canon Law
Canonization
Capuchins
Cardinal
Carthusians
Censer
Charity, Sisters of
Conclave
Index Expurgatorius
Indulgence
Innocents, Feast of Holy
Jesuits
Litany
Liturgy
Magnificat
Mass
Mendicant Orders
Mercy, Sisters of
Missal
Monasticism
Monk
Nun
Nunc Dimittis
Nuncio
Paulists
Penance
Concordat
Counter-Reformation
Dominicans
Eucharist
Franciscans
Hermits
Hierarchy
High Priest
Holy Water
Incense
Pope
Priest
Purgatory
Rogation Days
Rosary
Sacrament
Sacred College
Unction
Ursulines
Vatican Council

The list under the article RELIGION contains certain more general topics which will be of interest in this connection, and the biographies of the following churchmen, saints and religious leaders may also be consulted:

Ambrose, Saint
Anthony, Saint
Aquinas, Saint Thomas
Augustine, Saint
Augustine, Saint
Barbara, Saint
Becket, Thomas à
Begin, Louis Nazaire
Bernard, Saint
Boniface, Saint
Bridget, Saint
Bruchesi, Louis Paul
Cecilia, Saint
Chrysostom, Saint John
Corrigan, Michael
Augustine
Dunstan, Saint
Falconio, Diomede
Farley, John Murphy
Francis of Assisi
George, Saint
Gibbons, James
Ignatius, Saint
Ireland, John
Jerome, Saint
Lanfranc
Langevin, The Most
Reverend Louis
Loyola, Saint Ignatius of
Manning, Henry Edward
Mercier, Honoré
Merry del Val, Rafael
Mundelein, George W.
Newman, John Henry
Nicholas, Saint
O'Connell, William H.
Patrick, Saint
Ryan, Abram Joseph
Ryan, Patrick John
Satolli, Francesco
Sebastian, Saint
Spalding, John
Lancaster
Tertullian
Theresa, Saint
Thomas à Kempis
Ursula, Saint
Valentine, Saint
Veronica, Saint
Walpurga
Xavier, Francisco
Ximenes, Francisco

ROMANCE, *ro mans',* a name applied to any story, whether told in verse or in prose, which lays stress upon heroic or marvelous happenings and makes little attempt at presenting realistic pictures of life. Originally the term meant any composition in one of the Romance languages, but since tales of adventure, in the early periods of the modern era, were the most popular writings in those languages, the name gradually narrowed to its present significance. These languages were by no means the first in which such narratives were written, for the ancient Greeks delighted in stories of adventure which were clearly the forerunners of the modern romance. Of these the earliest is the *Odyssey.* The *Iliad,* which strove for truth in its

pictures of scenes and characters, could not be so classed, but its companion epic with its frankly mythical adventures fills all the requirements. Later Greek romances introduced many of the themes which were common in the popular medieval and early modern stories, notably the wanderings of parted lovers and their final reunion.

During the medieval period the romances which were so popular in Europe were in verse, adapted to recital by minstrels. Great national or local heroes were usually the central figures, and around their names were woven the most marvelous tales. About Charlemagne, Roland, Alexander, Arthur, Richard the Lion-Hearted, the heroes of the Trojan War, great cycles grew up, which were passed on from one bard to another, each amending or adding to the material received as he saw fit. In the days of chivalry, love became one of the main motives for the action, though it was very often the artificial platonic love of knight for noble lady, rather than a more human sentiment.

Gradually, even before the invention of printing, prose began to take the place of poetry in the making of romance. The cycle relating to Arthur, for instance, came into England in prose form in Malory's *Morte d'Arthur*. In the cases of the Spanish Cid and the French Roland, however, verse always remained the classic form of the narrative. By gradual growth the romance led to the novel, but some of the greatest novelists have been in the main writers of romances rather than of the type more correctly called novels. Thus, Scott's works stand as the greatest of historical romances; most of Stevenson's tales are pure romances of adventure; while Hawthorne ranks among the greatest of romance writers. A.MC C.

ROMANCE LANGUAGES, those languages of the world which have a common origin in Latin, such as French, Italian, Spanish and Portuguese.

Whenever Rome conquered a country it sent colonists to "Romanize" the province, and these colonists, of course, took their language with them. This was not the literary Latin used in the classics studied in the schools to-day, but what is called *vulgar Latin,* meaning simply the everyday speech of ordinary people, like soldiers, tradesmen and farmers. This language was not only modified by the original language of the conquered country, but it was also subjected to the changes every language undergoes when used by uneducated speakers. Thus, the Romance languages, though springing from the same Roman tongue, are distinct from one another; each is a characteristic product of the country in which it developed.

In addition to those already mentioned, the Romance group includes Provençal, or Early French, which was the language of the troubadours who sang their ballads and romances during the Middle Ages; modern Rumanian and Romansh, the latter a general name for the dialects in certain parts of Switzerland and the Tyrol, and in the region north of the Adriatic Sea.

Consult Grandgent's *Introduction to Vulgar Latin.*

Related Subjects. The reader is referred to the following articles in these volumes:

French Language	Provençal Language
Italian Language	and Literature
Latin	Troubadour

RO'MAN NUMERALS, *nu'mer alz,* the number symbols of the Latin language, used to-day for numbering clock faces, for marking books, particularly the pages of long prefaces, the chapters and the volumes of a series; for inscriptions on monuments and public buildings, and for numerous less important uses. But for all calculations in mathematics and in science, in business and in everyday life, the Arabic system has been used since the twelfth century (see ARABIC NUMERALS).

The Roman system of counting, like most others, is by tens. This is because the counting of all primitive people was done on the fingers. In the beginning it was not a letter system, although it is now written with the capital letters of the Latin alphabet. Most of the earlier symbols were derived from the Etruscans, a people that lived in the north of Italy many hundreds of years before the time of Christ. The symbol *I* was not the capital *I,* but was simply the most obvious mark for *one,* a vertical stroke. The symbols for two, three and four, *II, III* and *IIII,* are equally obvious. The origin of *X* (ten) was probably a crossed *I*. *C* (100) and *M* (1,000) stand for *centum* and *mille,* the Latin words for *one hundred* and *one thousand,* but in the beginning they, too, were expressed by Etruscan symbols which scarcely resembled the letters now used. These symbols may sometimes be found in the earliest printed books. The other signs are *V* (five), *L* (fifty) and *D* (500). There is no zero. All other numbers are made from combinations of the seven symbols given.

Numbers are written from left to right, and are made thus: an *M* is put down for every

separate thousand; then five hundred is taken and *D* is written for it; next, as many hundreds are taken as possible, and a *C* is written for each; fifty is then taken and *L* is written for it; as many tens as possible are next taken and *X* is written for each; five is then taken and *V* is written for it; and finally *I* is put down as many times as there are units left over. The number 2,500 is written *MMD* (one thousand plus one thousand plus five hundred); 3,550 is written *MMMDL*.

These numbers are not particularly long or tedious to write, but in order to express 3,768, which in the Arabic notation is just as brief as 3,550, this formidable row of letters must be put down: *MMMDCCLXVIII*. Quite recently subtraction by changing the position of the symbols has come into use. Instead of writing *IIII*, the *I* is placed before *V*, and we have *IV*, which expresses one subtracted from five. Nine is written *IX* instead of *VIIII*; forty is written *XL* (fifty minus ten). The year nineteen hundred used to be written *MDCCCC*, but it is now written simply *MCM*. A.C.

ROMANOFF, *ro'man awf*, more properly ROMANOFF-HOLSTEIN, the name of the family that ruled Russia from 1613 to 1917. At the beginning of 1613 the country, more than half barbarous, was leaderless; the nobles chose Michael Feodorovitch Romanoff, of the royal house of Rurik, to rule them, and called him *czar*. Nineteen Romanoffs in succession controlled the destinies of the country; in reality a twentieth was ruler for a few hours, but his tenure cannot well be included. Two great names are in the list, but most of the line were merciless autocrats. Because of their severity the term *czar* has become a word of reproach.

Peter the Great was the mightiest of the Romanoffs; he found Russia floundering and almost wholly unorganized, and he left it a strong nation. Catharine the Great, profane, immoral, witty, but a great constructive leader, made her country respected in the courts of the world. For the most part the other rulers kept the light out of Russia; they filled the country with subordinate officials who worked their masters' will; they hunted down all independent men with their remorseless secret service; they governed the land with hordes of wild, savage Cossacks; they brandished the knout instead of offering the ballot. They rode ahead, defying liberty and progress, and in themselves embodied the executive, legislative and judicial functions of government. Not until the twentieth century was a legislative body tolerated; at first it was not permitted to exercise power, but gradually it forced its due privileges from an unwilling monarch, and eventually overthrew that autocrat and itself became the temporary Russian government.

Nicholas II, fairly well meaning but weak, was the last representative of his line. When his abdication was forced March 15, 1917, he named his brother Michael his successor. The latter declared that unless it was Russia's will he would not ascend the throne. His abdication followed.

The first Romanoff was Michael, and he ruled thirty-two years; the last was Michael, czar for eighteen hours, but powerless. E.D.F.

Consult Edwards' *The Romanoffs: Czars of Moscow and Emperors of Russia.*

Related Subjects. The following articles in these volumes should be read in connection with this subject:

Alexander	Nicholas
Catharine	Peter the Great
Czar	Russia (History)

ROMANS, *ro'manz*, EPISTLE TO THE, the most important of all the letters written by Paul the Apostle. In this he states fully his doctrinal beliefs. The epistle was written from Corinth in the winter of 57, while he was on his third missionary journey. The theme of the whole letter, which forms a book in the New Testament, is found in this verse: "The gospel is the power of God unto salvation to every one that believeth" (*Romans* I, 16). Thus he sets forth the doctrine of justification by faith, which Luther adopted as the basis of his system (see LUTHER, MARTIN; REFORMATION, THE).

ROMANTICISM, *ro man'ti siz'm*, the name given in literature to the movement which marked a change from a rigid adherence to classic standards to an appreciation of imagination, sentiment and the beauties of nature. No sharp line can be drawn between the romantic period and the classic which preceded it; no one country or poet can be given as the originator of the movement, but the change, though gradual, was very pronounced. No period in English history was ever more completely dominated by classic ideals than the so-called Augustan Age of Queen Anne. In poetry, particularly, form was placed before matter, and Pope was held by many to be the greatest of English poets because of the uniform correctness of his verse. Didactic and argumentative topics, which many present-day critics declare have no part at all in real poetry, were almost the only themes. See CLASSICS.

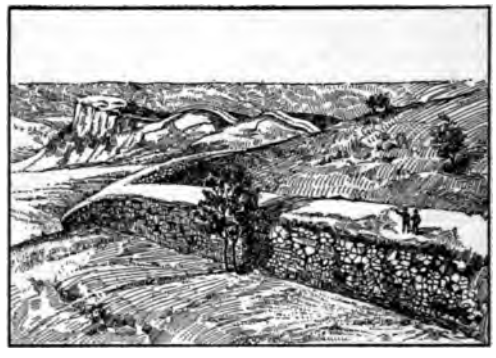
In 1727-30 James Thomson published his *Seasons,* in which for the first time the note of interest in nature reappeared. Gray's *Elegy Written in a Country Churchyard,* Goldsmith's *Deserted Village* and Cowper's *Task* repeated and strengthened the note, and Percy's *Reliques of Ancient English Poetry,* published in 1765, reawakened that interest in the past which was one of the characteristic features of the romantic movement. Milton and Spenser, who had been looked upon as inferior to Pope, came into their own again, and their verse forms, instead of the mechanical couplet form of Pope, were imitated. The romantic movement in England reached its height in Scott, Byron, Wordsworth, Shelley and Keats, while in prose Stevenson was perhaps the greatest writer after Scott who emphasized the romantic side.

In other countries the romantic spirit gained ground just as it had done in England. The German authors Lessing, Herder, Goethe, and the group composed of the Schlegel brothers, Novalis, Tieck and others, stood at the head of the movement in their country, while in France Rousseau, Chateaubriand and Victor Hugo had most to do with the passing of the old classicism.

Consult Phelps' ***Beginnings of the English Romantic Movement;*** Herford's ***Age of Wordsworth.***

ROMAN WALLS, the lines of defensive walls erected by the Romans to protect the northern boundary of Britain from the inroads of the warlike Picts and Scots. Remains of these walls are still to be seen, and they bear striking witness to the permanent character of the work undertaken in ancient days. The first defensive walls were erected by Agricola, about A. D. 80. Of this wall a few traces remain.

The fortifications running from the River Tyne to the Solway, completely across the northwest part of England, built by Hadrian in A. D. 120 and strengthened later by Severus, extended over eighty miles in length. Parts of

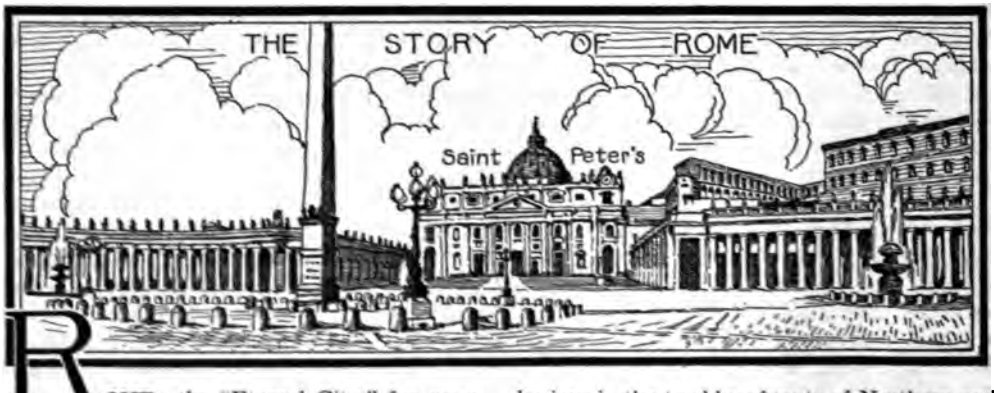


HADRIAN'S WALL

The average height at the time of building was the height of three men, one upon the shoulders of another. This wall has crumbled, but in Northumberland are to be found portions which are still twelve feet high.

the actual wall still remain. In places are still to be seen the stone drinking troughs, the guardhouses and much of the stonework of the huge gateways, with the center stones worn away where the gates once met in closing.

The Wall of Antoninus, built in A. D. 139 between the rivers Forth and Clyde, marks the northern boundary of the Roman Empire. The Romans could press no further against the valiant Picts and Scots, who waged incessant warfare and were never conquered.



ROME, the "Eternal City," for many reasons the most interesting of the world's cities. Thousands of years ago, when the ancestors of the English and Americans were living as barbarians in the trackless forests of Northern and Western Europe, it was a great city, and the center of a greater empire; it was the mighty mistress—

"That sate on her seven hills, and from her throne
Of beauty ruled the world."

Though it has had its periods of depression, it stands to-day as one of the greatest cities of romance and power and as the center of the Roman Catholic Church, the holy city toward which the eyes and thoughts of millions are directed. It thus differs from those ancient cities whose only interest is in the past.

It is the capital city of Italy, located near the western coast of the country, about fourteen miles from the mouth of the Tiber, the only navigable river of the peninsula. It bore in olden times the name of the "City of the Seven Hills," for it was built upon a group of hills or ridges which rise out of the plain.

Only from a study of its history can come a comprehension of the wonderful place which Rome has filled in the life of the world.

The Ancient Mistress of the World

The Mediterranean Sea was the center of the ancient world. Slowly civilization spread about its shores from east to west, from Egypt and Western Asia to Greece, and, finally, to Rome; and each nation, as it rose, developed and eventually disappeared, contributed something to the growing civilization. Rome stood as an example of law and government—for the ability to organize an empire and to rule it; and it also preserved and handed down the treasures of science and of art which it had received from the older nations. Says a modern historian, "The Roman Empire is the lake in which all the streams of ancient history lose themselves and which all streams of modern history flow out of." The history of Rome is ancient history, but without a study of it modern history cannot be understood.

The Period of Legend. The Romans were very proud of their origin, for were they not descended from that great hero of Troy, Aeneas? Wandering about after the fall of the city, legend says, he was led by the gods to Italy, and there his son founded Alba Longa (the Long White City), which became the chief of the Latin cities. Centuries later, Romulus founded on the Palatine, one of the seven hills, a new city which was called Rome. This, according to the commonly accepted tradition, was in 753 B. C., and all through later times Romans dated all events *ab urbe condita,* "from the founding of the city." Other settlements were made on the neighboring hills, and in time these all merged into one city, which had its assembly place and market place, or *forum,* in the hollow between two of the hills, and its citadel on the Capitoline hill (see map for location of the seven hills). Tradition says that in these early days Rome was a kingdom, and the names of the kings are given, with many of the events of their reigns—Romulus, Numa Pompilius, Tullus Hostilius, Ancus Martius, Lucius Tarquinius, Servius Tullius and Tarquinius Superbus. The last-named of these was so tyrannical that the people rose against him in 509 B. C. and expelled him, vowing that never again should one man hold lifelong power in Rome. A republic was therefore declared, and the very name of king became hateful.

Classes in Early Rome. All these stories of the years of the kingdom are purely legend, many of them consciously invented by writers in succeeding centuries just to glorify Rome, but certain things about the organization of society are definitely known. The descendants of the earliest settlers reserved for themselves the rights of citizenship—they were the *patricians,* or "men with fathers." Later on, as Rome extended its sway beyond the walls and as inhabitants from the conquered towns of Latium moved into the city, another class was formed which had no political rights. These "common people" were known as the *plebeians;* and much of the early history of Rome is taken up with their struggles with the patricians. They resented the fact that they could have no part in the *comitia curiata,* that earliest popular assembly, though they did not venture thus early to hope for membership in the Senate, which was composed of the chiefs of the three hundred clans. Even before the close of the hazy, almost mythical royal period, the plebeians had gained some rights; true, these were dependent on property qualifications, but even that was a distinct advance toward democracy.

Early Days of the Republic. The chief officers in the new republic were two consuls, who were chosen for one year and had joint sway. In effect, they were kings, possessing wide powers, which were limited only by the shortness of their term. Rome was not a republic in the sense that it had "a government of the people and by the people;" the plebeians, indeed, were in a less favorable position than under the later kings. But the strife went on, and by 494 B. C. the lower order had gained one

concession—the creation of two *tribunes of the people,* who had as their special office the protection of the rights of the plebeians. The latter party also succeeded in having their assembly of tribes, always an unrecognized body, given legal standing and certain definite powers, for they had hit upon a very effective method. They simply threatened to secede from Rome and build a city of their own; and the patricians, because they could not do without the working classes, grudgingly gave in to their demands.

Written Laws. Hitherto the laws had never been written, and of course they could be more or less distorted by anyone in power. Now the plebeians demanded a regular code, so that every one might know what really was the law, and though the patricians fought hard they were finally compelled to submit to the appointment of *decemvirs* and the drawing up of the Laws of the Twelve Tables. These served as the basis of all later Roman law. Connected with this period of the decemvirs is the story, variously told but always interesting, of Virginia, whose father killed her rather than to see her led away to slavery and shame. Macaulay's poem *Virginius* tells the story.

Other Plebeian Gains. Not content with their growing political power, the plebeians demanded social equality, and in 467 B.C. compelled the Senate to agree to a law permitting marriage between the two classes. There was still one sharp grievance, however—the sacred office of consul remained open only to patricians. The Senate agreed to the election of military tribunes with consular powers, who might belong to either order, but even this was not satisfactory, and the struggle continued. In 367 B.C. the Senate was forced to agree to the Licinian Law, which declared that one consul each year must be a plebeian; and the great victory had been won.

External Expansion. Outwardly this period had not been one of peace. The Etruscan towns, subdued during the time of the kings, revolted after the kings had been driven out, and Rome had to fight for its very life. Volscians, Etruscans and Aequians led their armies against the city, but in the end Rome conquered and became again the head of the league of Latin cities. But in 390 B.C. there came a stronger enemy, the Gauls from the north. They sacked the city, destroying everything valuable in their seven months' stay, but

failing to take the citadel, which was heroically defended by Manlius. After 367 B. C., when the class struggle finally closed, expansion was rapid. It was not, however, unresisted. The Latins revolted for the last time in 338 B. C., but were crushed and made subject to Rome; and in 326 began a struggle with the Samnites, rude and aggressive mountain tribes, which did not terminate for almost fifty years, but which left Rome dominant in the peninsula. One more struggle, with Pyrrhus, king of Epirus, and all the peoples of Italy acknowledged the supremacy of the city on the Tiber.

"Carthage Must be Destroyed." But outside of Italy was an enemy not so easily subdued—Carthage, on the North African coast, the greatest sea power in the world. Though originally the two cities had been allies, an inevitable jealousy had grown up between them which in 263 B. C. resulted in open war. Three terrific combats known as the Punic Wars were fought before Rome gained that final victory which had been made possible only by the creation of a navy and the breaking of Carthaginian power on the sea. True, the close of the First Punic War in 241 B. C. saw Carthage exhausted and ready to make almost any terms, but Rome realized, as the statesman Cato declared in every speech, that "Carthage must be destroyed," and consequently prepared for further war. In the Second Punic War (218-202 B. C.) the outstanding figure was Hannibal, the Carthaginian general, whose crossing of the Alps was one of the dramatic events of history. The disasters which the Romans suffered at his hands were avenged when Scipio won his decisive victory at Zama, and Carthage gave up to Rome all of its colonial possessions, its navy and its elephants and promised never again to make war without the consent of Rome.

Philip V of Macedon, in the old Greek state, had aided Hannibal, and to punish him Rome sent armies to the East. In three wars, the last one ending in the complete defeat of the Greeks at Corinth in 146 B. C., the Macedonian empire was broken up and Greece was made a Roman province. In the same year also ended the Third Punic War, which consisted merely of the three-year siege of Carthage. The defense was heroic but vain, for the splendid city was destroyed and the Carthaginian empire was ended. Meanwhile Spain, received from Carthage, had proved very unsubmissive, and only by the constant presence of a large army could it be kept in subjection.

Last Century of the Republic. During this period the two streams continued to flow side by side—of class dissension within, of conquest without. A change had begun to show itself in the national character—a departure from the simplicity and severity of the early life and an ever-increasing luxuriousness and immorality. Occasional reformers arose, but never was the tide successfully stemmed, and through all the years when Rome was most glorious in the eyes of the world its people were slowly disintegrating, slowly preparing for that decline which later came with such apparent rapidity. Sincere and steadfast belief in the old gods was dying out, and to take its place there was only skepticism among the upper classes and superstition among the lower.

Internal Affairs. Nominally, both orders of Roman citizens had the same civil and political rights; in reality, however, power was in the hands of the wealthy nobles, who governed entirely in their own interests. Champions of the plebeians were not wanting who fought desperately to better their condition, but little of permanence was accomplished. The land system continued as unjust, the officials as untrustworthy. Nor were the plebeians within the city the only ones who struggled for their rights. The subject Italian peoples, demanding the rights of citizenship which had been limited to the inhabitants of Rome, precipitated in 91 B. C. the so-called Social War, in which the military genius of Marius, Sulla and Pompey made Rome victorious. But, wisely enough, the subject peoples were given what they demanded, and henceforth had the franchise. Three years later the jealousy of Marius and Sulla led to that bloodthirsty conflict known as the Civil War, in which the two parties, the lower class under Marius and the patricians under Sulla, proved equally violent. No man was safe from massacre, and not until 82 B. C. was the struggle ended by the triumph of Sulla. In 63 B. C. another danger threatened the city—the conspiracy of Catiline—which was foiled only by the watchfulness and genius of Cicero.

External Conquests. During this time more than one war was brought to a successful conclusion. Jugurtha, who had seemed invincible, was conquered by Marius, and the terrible menacing hordes of the Cimbri and Teutons were turned back by the same hero, at a time when it had seemed that Rome was surely doomed. Another famous conflict of these years was the war with Mithridates of Pontus. It was the appointment of Sulla to the com-

mand of this war which had so inflamed the jealousy of Marius, but it was Pompey who brought the struggle to a successful conclusion. But the most important of all in their after effects were the campaigns of Caesar in Gaul, which made him so popular and so powerful that Rome lay at his feet.

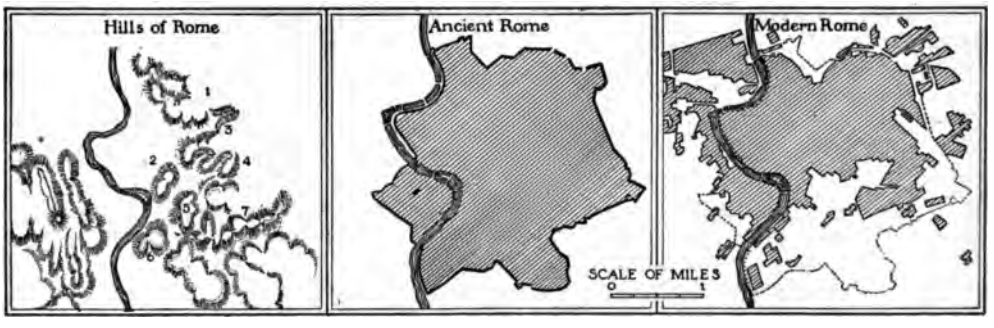
The name of Pompey suggests a list of names of men who for a period held the fate of Rome in their hands; for the Senate, so long almost absolute, had lost by degrees its power, and the day of the individual had come in Roman history—of the individual who was strong enough and unscrupulous enough to seize the power and wield it for his own good. Pompey, Caesar, Crassus, Cicero, Lepidus, Mark Antony, Augustus—the lives of these men made up the history of Rome in this concluding period of the republic. Civil war followed the death of Caesar, and from it one man, Octavius, emerged supreme.

by, "Is it lawful for you to scourge a man that is a Roman, and uncondemned?"

And when the centurion heard it he went to the chief captain and told him, saying, "What art thou about to do? For this man is a Roman." And the chief captain came and said unto him, "Tell me, art thou a Roman?" And he said "Yea." And the chief captain answered, "With a great sum obtained I this citizenship." And Paul said, "But I am a Roman born."

They then that were about to examine him straightway departed from him; and the chief captain also was afraid when he knew that he was a Roman, and because he had bound him.

Occasionally during the first two centuries a tyrant arose, as Tiberius or Nero, who set aside the forms of constitutional government and was frankly despotic. In the main it was only the city of Rome which suffered at the hands of such men, the provinces being efficiently governed; but in the later years even the forms of constitutionality were ignored.



THE ANCIENT AND THE MODERN CITY

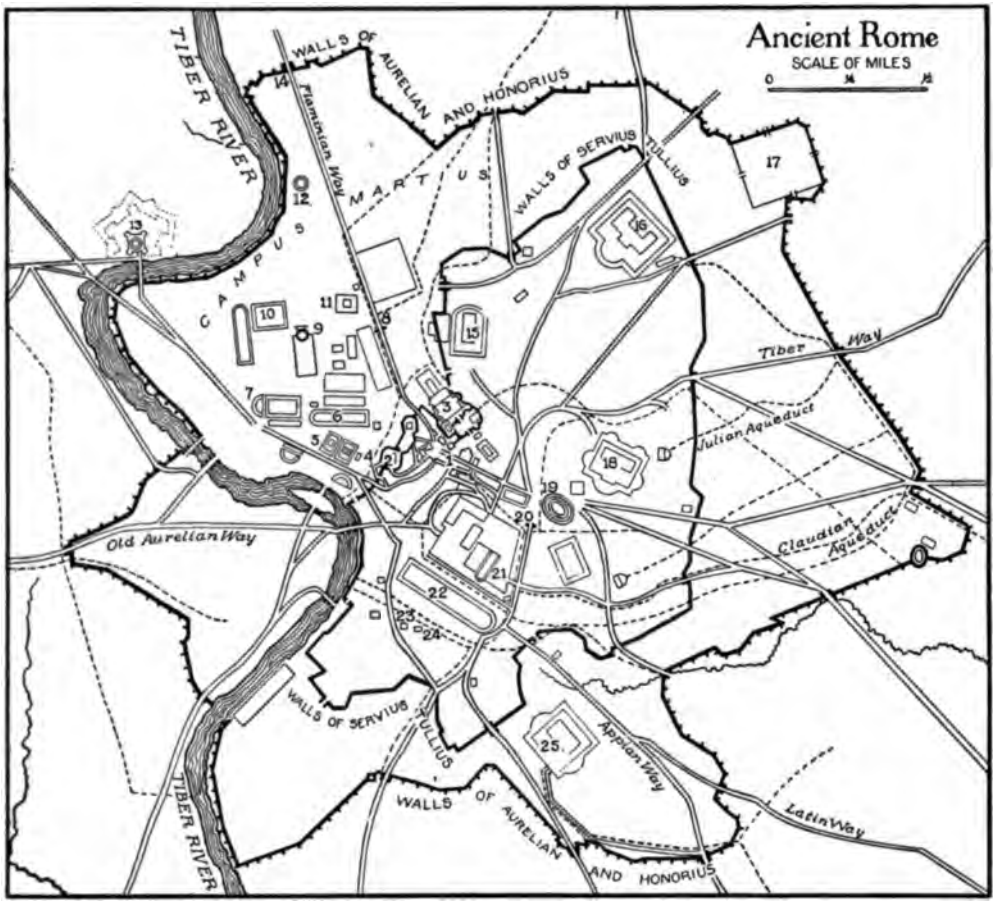
At the left the location of the seven hills is shown; they are (1) Quirinal, (2) Capitoline, (3) Viminal, (4) Esquiline, (5) Palatine, (6) Aventine, (7) Caelian. The second and third maps compare the areas of the ancient city and present-day Rome.

The Growing Empire. Having rid himself of all rivals and accepted from the hands of a compliant Senate all the highest offices, Octavius, or Augustus, as he was henceforward called, established what was in effect an empire, though the name and some of the forms of the republic were still preserved. During his time the glory of Rome was at its height, and though none of his successors equaled him in ability, the power was so firmly grounded that it endured and even apparently increased for almost two centuries. To be a Roman citizen was one of the greatest honors the world afforded, for back of every citizen stood the vast power of the Empire. The book of *Acts,* in describing the persecution of Paul in Jerusalem, has the following significant passage:

And when they had tied him up with the thongs, Paul said unto the centurion that stood

Tiberius, the successor of Augustus, was able but unscrupulous, and it was he who instituted the system of spying which so many of the later emperors employed. During his reign occurred the Crucifixion of Jesus of Nazareth. His successors were the mad Caligula (37-41), with his insane follies; Claudius (41-54), during whose reign Southern Britain was subdued; and Nero (54-68), whose name is a synonym for cruelty and viciousness. During his reign the burning of Rome took place, and the persecution of the Christians, who were accused of having set fire to the city.

A listing of the emperors is not necessary. Many of them were mediocre men, who obtained their power by bribing the army; but now and then one stands out by reason of especial ability or goodness. Thus there were Vespasian and Titus, father and son, whose reigns were noteworthy for their freedom from tyr-



IMPORTANT FEATURES OF THE ANCIENT CITY

1. Forum
2. Capitol
3. Forum of Trajan
4. Temple of Apollo
5. Temple of Jupiter
6. Circus Flaminius
7. Theater of Pompey
8. Arch of Diocletian
9. Pantheon
10. Baths of Nero
11. Temple of Neptune
12. Tomb of Augustus
13. Tomb of Hadrian
14. Flaminian Gate
15. Baths of Constantine
16. Baths of Diocletian
17. Camp of Praetorian Guard
18. Baths of Trajan
19. Flavian Amphitheater (Colosseum)
20. Arch of Constantine
21. Hippodrome
22. Circus Maximus
23. Temple of Minerva
24. Temple of Diana
25. Baths of Caracalla

anny; and there were the "five good emperors," Nerva, Trajan, Hadrian, Antoninus Pius and Marcus Aurelius, whose reigns extended from 96 to 180. It was during the reign of Trajan that the Roman Empire reached its very greatest extent, for Hadrian, realizing that far-distant frontiers were but a danger to the Empire, abandoned the territories beyond the Euphrates in Asia.

The Decline of the Empire. This began with Commodus (180-192), the infamous son of the illustrious Marcus Aurelius, and proceeded slowly at first, but later with frightful rapidity. The army became the dominant force and for almost a hundred years (193-284) placed upon the throne one after another of the "barrack emperors," so called because they were placed in power by the army. The first of them, Septimius Severus (193-211), was the ablest, and, if he governed with a firm hand, like a soldier, he at least kept the Empire intact. A second persecution of the rapidly-spreading sect of Christians took place under him, but later he took the new religion under his protection. A temporary respite came with the reign of Alexander Severus, who was a just man, but after his time came chaos and almost anarchy. Within the city there were warring claimants to the throne; on the borders savage hordes were pressing farther and farther in. From 268 to 284 there was a succession of emperors who showed some ability, and for a time the tide

was stemmed, but their reigns were short and they accomplished nothing permanent.

Diocletian (284-305), under whom occurred the last frightful persecution of the Christians, perceived that one man could not administer so great an empire, and divided the state into East and West empires, making Maximian joint emperor, and from that time on there are two parallel streams of Roman history. The dissolution had begun; but under the great Constantine, who was sole ruler from 323 to 337, the state was again united. He made Christianity the state religion, and moved the center of government from Rome to a newly-founded city on the Bosporus, which he called Constantinople. After Constantine's death came another period of wild disorder, during which the only living, growing thing in the Empire seemed to be the Church. Julian (361-363), called *the Apostate,* tried to restore paganism, but the Church had become too strong to be overthrown.

The Fall. Occasionally an emperor or a general arose who was strong enough to beat back the barbarians—Huns, Goths, Franks, Alemanni or Visigoths—who were threatening the frontiers, but it became clear that the end of Rome's power was approaching. Theodosius the Great (379-395) might in a more favorable time have proved one of the strongest of the emperors, but even his efforts were in vain. In 410, when the genius of the famous general Stilicho was no longer opposed to them, the Goths under the ruthless Alaric ravaged the peninsula of Italy, and for three days pillaged Rome. The legions had to be withdrawn from the provinces to protect the city, and everywhere the barbarians pressed in. The Visigoths took Spain and Southern France, the Vandals possessed themselves of Northern Africa, and the Huns laid waste the Eastern districts. In 451 the Huns under Attila were turned back from Rome only by the pleas of Leo the Great, bishop of Rome. Four years later the Vandals sacked the city, and then for a period the Suevic Ricimer was supreme in the city, though there was still a nominal emperor.

The powerless ruler in 476 was a boy who bore, strangely enough, the name of Romulus, founder of the city. Perceiving his weakness, Odoacer placed himself at the head of all the hired troops in the city and dethroned Romulus, and took the title of king of Italy. Thus the Roman Empire was brought to an end, though in the time of Charlemagne the name came into vogue again in connection with that strange creation, the Holy Roman Empire (which see). For the Eastern Roman Empire, see BYZANTINE EMPIRE.

How the City Looked. The city which was the center of this vast Empire naturally bore in its long history many aspects, but the best-known one is that which it presented in the days of Augustus. He "found a city of wood and left one of marble," it was said, but most of the streets were narrow and crooked, and some of them were very dirty and squalid. Some parts, however, with their white marble buildings, their porticoes and triumphal arches, were marvelously beautiful. Just what the limits of the city were in those days cannot be known, but it was doubtless somewhat larger than the later walled city; for it was not until the days of Aurelian (270-275) that a line of fortifications was built about the city. Nor is it possible to determine just the population of the city. Some authorities declare that in the days of the early Empire it was 2,000,000, but this is regarded by most scholars as an extravagant estimate.

The centers of the city's life were the *fora* (plural of *forum*), or open places for public meetings, and one of these was so much more important than the others that it was called *the* Roman Forum. Far more splendid, however, was the forum of Trajan, about which were grouped some of the most beautiful buildings of the city. Here stands to this day the great Column of Trajan with its sculptures which have revealed to modern scholars much about the customs and methods of fighting, as well as about the history of Trajan's day.

The Romans were famous for their engineering works, and most of all, perhaps, for their roads. Within the city the chief street was the *Via Sacra,* or Sacred Way, which ran from the Forum to the summit of the Capitoline Hill, where stood the oldest and most sacred temple in the city—that of Jupiter Capitolinus. Along this road, whose lava-block pavement is still in fairly good condition, passed the famous triumphal processions of the emperors and generals, as they returned from victorious wars. Without were those world-famous roads, the Appian Way and the Flaminian Way. Then there were wonderful sewers, of which the most famous, the *Cloaca Maxima,* is still in use, though it was built in the time of the kings; and the aqueducts through which water was brought to the city from the far-away Apennines. Some of these still carry the city's water supply. See AQUEDUCT.

Buildings. To list all of the important buildings in an article of this length is impossible; some few, however, must be noticed. There were temples everywhere—no fewer than three hundred of them, it is said; and the sites of many of these are known. Most famous of all was the Pantheon, a temple to all the gods, as the name indicates. This great, circular-domed building is to-day the most perfectly preserved of all the ancient Romans' structures. Some of the old temples have been turned, in part at least, into churches and so have been preserved.

There were numerous public baths, which formed one of the most characteristic features of the imperial city, and the ruins of some of these great buildings, with their sumptuous decorations, prove the love for luxury which was an inherent part of Roman character in imperial days. Of amphitheaters, in which the city abounded, the oldest was the *Circus Maximus,* built in the days of the kings, but the most famous was that known as the Colosseum, which constitutes the most imposing ruin of Rome. Many of these theaters were built on the *Campus Martius,* the great plain within the curve of the Tiber, which was given up largely to sport and to military exercises. Another characteristic feature of the city was the triumphal arches, those soaring structures which the emperors built to commemorate their victories.

One of the illustrations accompanying this article gives an idea of the city and of its best-known landmarks in the days of its great prosperity.

The Modern City of Rome

It is impossible to consider the "Eternal City" simply as the capital of a modern nation apart from its historic associations, for there are evidences of the latter on every hand.

General Description. Rome to-day is about fifteen miles in circumference. About it stretches a wall which is in large part that built by the Emperor Aurelian, and within this the Tiber divides the city into two unequal parts. On the right bank are those great centers of Catholic Christendom, the Vatican and Saint Peter's, and a populous section has sprung up around them; but the larger part of the city is on the other side of the Tiber, on the old Campus

Martius. Ten fine bridges, three of them ancient in part, cross the river within the city walls, and the treacherous stream has been confined within stone embankments, that it may not overflow as in former times. All in all, though it still has its "slums," Rome is an attractive city, and since the introduction of modern improvements it is healthful, despite its situation on the fever-breathing *Campagna*, the plain surrounding Rome, made malarial by the overflow of the Tiber and the resulting marshes. This area has lately been drained and made more healthful.

The Seven Hills. The Palatine Hill, where was planted the very earliest settlement, is now in part a public park, in part a mass of ruins among which excavations are still being made. Here stood in olden times most of the palaces of the wealthy Romans, and modern research is revealing remains of great splendor. On the Aventine and Caelian hills, too, are ruins, and little else, for few modern habitations have been built there, while on the Esquiline and Viminal have sprung up crowded industrial quarters. The Quirinal, near the center of the modern city, is crowned by the royal palace and the chief public buildings, while the Capitoline Hill, as in ancient days, is a most impressive spot. Here stands the Capitol, designed by Michelangelo to take the place of the ancient structure, and here are famous modern museums of art and the great monument erected to Victor Emmanuel.

Other hills there are which were not numbered with the original seven—the Pincio, which with its beautiful gardens and walks constitutes a favorite afternoon resort, and the Janiculum, on the other side of the Tiber. This was the old lookout spot, the outpost of the city.

> For since Janiculum is lost,
> What hope to save the town?

says Macaulay. To-day it is laid out in public drives and walks.

Buildings and Institutions. Rome has its full share of churches, among which may be mentioned the great Saint Peter's and the Lateran; and of palaces, of which the Barberini, Colonna, Farnese, Orsini and the Borghese (outside the city) are the most famous. This latter contains a celebrated collection of pictures, by no means the only one in the city, for Rome is rich in museums, whether of paintings, of sculpture or of antiquities. The greatest is that of the Vatican, but the Capitoline Museum also contains some of the world's chief art treasures.

Among the schools of Rome the university is the oldest and most famous, but it has no longer the importance which it possessed four centuries ago. There are several seminaries for the training of priests and of diplomats, various academies of arts and sciences and schools for classic study founded by almost all the leading nations. Best known of these to Americans is the American School of Classic Languages. For a long time Rome was the center of art study; this position it no longer holds, for it has been surpassed by Paris.

Industrial Life. The Campagna about Rome has been, until recently, mainly an untilled waste, and most of the provisions of the city were brought from a distance. This is yet true, to a great degree. Its chief commerce is in cattle, grains and wine. In return it sends out its limited manufactures, mostly such art objects as mosaics, terra cotta, copies of well-known paintings and statuettes, though artificial flowers and imitation pearls are made in considerable quantities. But industrially Rome is of minor importance.

History. For centuries after the fall of the Empire Rome was but a dependency of the Byzantine Empire, and had no history but that of the Church. Latterly its life has been merged in that of Italy, for with the stirrings of the desire for Italian unity came a renewed feeling for Rome as a secular as well as a Church capital. In 1848 Pope Pius IX was driven from the city and a republic was formed, but in the next year French troops recaptured the city, and under their protection the Pope reigned until 1870, when Italian troops possessed it. In the following year the famous city, with all its heritage of glory and of disaster, became the capital of United Italy. The king took up his residence in the Quirinal, and the Pope became, according to his own description, a "prisoner in the Vatican."

The population of Rome, according to the census of 1913, was 576,435. A.MC C.

Consult Ferrero's *Greatness and Decline of Rome* (translation by Zimmern and Chaytor); Baddeley's *Rome and Its Story;* Myers' *History of Rome;* Abbott's *The Common People of Ancient Rome.*

Related Subjects. The following articles in these volumes will be of interest in connection with this study of Rome:

HISTORICAL ARTICLES

Agrarian Laws	Caesar
Appian Way	Campus Martius
Atrium	Censors
Augurs	Cimbri
Byzantine Empire	Circus

Colosseum
Comitia
Consul, subhead *The Roman Consul*
Decemvirs
Equestrian Order
Fabius
Fasces
Flamen
Forum
Gladiators
Goths
Helvetii
Huns
Italy, subtitle *History*
Legion
Lictors
Lupercalia
Pantheon
Patrician
Plebeians
Pontifex
Praetor
Praetorian Guard
Punic Wars
Quaestor
Quirinal
Quirinus
Quirites
Sabines
Samnites
Saturnalia
Tarpeian Rock
Toga
Tribune
Triumph
Triumvirate
Twelve Tables, Law of the

BIOGRAPHIES

Agricola, Gnaeus Julius
Alexander Severus
Antony, Mark
Augustus
Aurelian, Lucius Domitius
Aurelius, Marcus
Brutus, Marcus Junius
Caesar, Caius Julius
Caligula
Catiline
Cato
Cicero, Marcus Tullius
Cincinnatus, Lucius Quinctius
Claudius
Cleopatra
Constantine
Crassus, Marcus Licinius
Diocletian
Domitian
Galba, Servius Sulpicius
Gracchus
Hadrian
Hamilcar Barca
Hannibal
Jugurtha
Julian
Justinian I
Lepidus, Marcus Aemilius
Lucretia
Marius, Caius
Mithridates
Nero
Nerva
Numa Pompilius
Odoacer
Otho, Marcus Salvius
Pompey
Pyrrhus
Regulus, Marcus Atilius
Romulus
Scipio
Seneca, Lucius Annaeus
Servius Tullius
Severus, Lucius Septimius
Sulla, Lucius Cornelius
Tarquinius, Lucius
Theodoric
Theodosius
Tiberius
Titus
Trajan
Valens
Valentinian I and III
Vespasian

ROME, GA., the county seat of Floyd County, is situated in the northwestern part of the state, at the point where the Etowah and Oostanaula rivers unite to form the Coosa. Atlanta, the state capital, is seventy-two miles southeast. The Central of Georgia, the Nashville, Chattanooga & Saint Louis, the Rome & Northern, the Western & Atlantic and the Southern railways provide railroad transportation, and an electric line connects with adjacent towns south. Rome was chartered as a city in 1847, and in 1915 it adopted the commission plan of government. In 1910 the population was 12,099; in 1916 it was 15,120 (Federal estimate). The city has an area of five square miles.

Rome is the commercial center for one of the most productive regions of the state, the river valleys yielding large quantities of cotton, grain and hay, and the more elevated lands producing a great variety of fruits and vegetables. This district is also rich in iron, limestone, coal and fire clay. Cotton mills, cottonseed-oil factories, hosiery mills, tanneries, fertilizer and furniture factories, foundries and machine shops are important among the industrial plants. The notable buildings are the post office, city hall, county courthouse and Carnegie Library. Eight bridges span the rivers and several monuments ornament the city. Rome was for a long time the home of Charles Henry Smith (Bill Arp), the humorist.

ROME, N. Y., a quaint old city of historical interest, in the central part of the state. It is one of the county seats of Oneida County, and is situated on the Mohawk River at the junction of the Barge, Erie and Black River canals, fifteen miles northwest of Utica, thirty-nine miles east of Syracuse, and twenty-two miles east of Lake Oneida. The New York, Ontario & Western and the Rome, Watertown & Ogdensburgh division of the New York Central Lines meet here, and electric lines extend east and north from the city. In 1910 the population was 20,497; in 1916 it was 23,737 (Federal estimate). Italians and Poles predominate in the foreign element.

Rome is located in a part of the Mohawk Valley well adapted to farming and dairying, and the city is noted for its output of cheese and butter. Its shipping facilities, by rail and by water, give it commercial and industrial advantages. About 8,500 people are employed in the 125 manufacturing plants, which have a combined annual output valued at $30,000,000. The largest of these are brass and copper mills, locomotive works, knitting mills, metal bedstead factories, canneries and breweries. The post office, constructed in 1904 at a cost of $87,000, a $74,000 city hall, the State Custodial Asylum for mental defectives, Central New York Institution for Deaf Mutes, Oneida County courthouse and the home of the Y. M. C. A. are the noteworthy buildings. For advanced education there are Rome Free Academy and Saint Aloysius and Holy Name academies, and there is a fine public library. Features of interest in and near the city are Fort Stanwix Park, Lake Delta, and the great engineering triumph, Delta Dam.

Historical. The city is built on the site of Fort Stanwix, erected by the English in 1758.

The first settlement was made in 1760. Fort Stanwix was a storm center during the Revolutionary War, and in the vicinity the famous Battle of Oriskany was fought, in August, 1777. Here for the first time the enemy saw the new emblem of the nation, adopted by Congress on June 14, 1777 (see FLAG, subtitle *United States Flag*). Stanwix was the only one of thirteen frontier forts to resist the attacks of the English from the north. Rome became a town in 1796, was incorporated as a village in 1819 and was chartered as a city in 1870. The arsenal established here in 1814 was sold as a factory in 1873.

RO'MEO AND JULIET, *joo'li et,* a tragedy by Shakespeare, printed first in 1597, and in a corrected form two years later. The immediate source of the plot was a poem, the *Tragicall Historye of Romeus and Juliet,* written in 1560 by Arthur Brooke, but the story was an old one and had appeared in various forms. The theme is the love of Romeo, of the house of Montague, and Juliet, of the house of Capulet, and the tragedy is brought about by the age-long feud which exists between the two families. Over the dead bodies of the young lovers the quarrel is finally laid aside. The rôles of the title characters have always been favorites, particularly with young actors and actresses. Of recent years E. H. Sothern and Julia Marlowe are the most distinguished players who have taken the parts. Bellini and Gounod each used the Romeo and Juliet story as a basis for an opera, and Berlioz wrote a dramatic symphony on the subject. Among familiar quotations from Shakespeare's play are these:

The weakest goes to the wall.

What's in a name? That which we call a rose
By any other name would smell as sweet.

Too swift arrives as tardy as too slow.

My bosom's lord sits lightly in his throne.

ROMULUS, *rom'u lus,* the legendary first king of Rome and the founder of the city. He and his twin brother, Remus, were held to be sons of Mars and Rhea Silvia, who was a daughter of Numitor, king of Alba. Amulius, brother of Numitor, who had usurped the Alban throne, ordered the mother to be buried alive because she had broken her vestal vows and the two children to be thrown into the Tiber. The river, however, received them kindly, and bore them to a little bank, where it cast them ashore at the foot of a fig tree. Here they were found by a she-wolf, who cared for them until they were discovered by the shepherd Faustulus and by him taken to his own home. They were brought up with his children and became strong and handsome young men, fond of the sports of the shepherds but showing in all their superior birth.

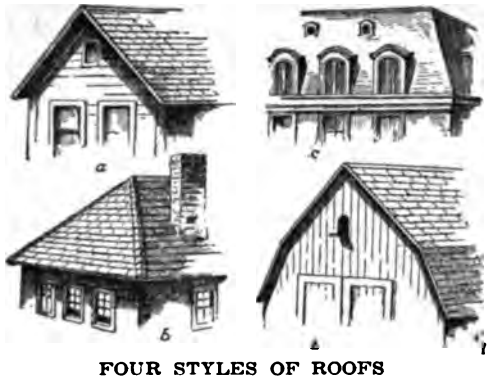
Legendary Founding of Rome. One day Remus became involved in a quarrel with the shepherds of Numitor, before whom he was taken for judgment. Romulus came to his rescue, and the bearing of the young man so impressed Numitor that he inquired as to the story of their lives. The secret of their birth being discovered, a plan was made by which the usurper Amulius was driven from the throne of Alba, and Numitor was restored. Soon afterward the young men decided to build a new city on the Tiber River, at the spot where their lives had been saved by the wolf. They fell into a quarrel as to its exact location, and submitted their dispute to the decision of the gods; the oracle having decided in favor of Romulus, he began at once to mark out the boundaries of his city with a plow. He turned the furrows inward and lifted the plow to mark the space for his gates, enclosing within the limits the Palatine Hill and a little land at its base. Remus contemptuously leaped over this boundary, saying that such a wall could never protect a city. With the exclamation "So perish whoever shall hereafter cross these walls," Romulus struck his brother and slew him, an act which he instantly regretted.

THE SUPPOSED WALL OF ROMULUS
A part of the wall believed to have been built at the founding of Rome.

His new town grew rapidly, for young men came in from every direction. The surrounding tribes looked upon the Romans as little better than outlaws and refused to allow their daughters to marry them. The dwellers in the new city, therefore, stole wives from the Sabines, with whom they were then forced to go to war. After several conflicts in which the Romans were invariably successful, the Sabines united with their new neighbors, their king ruling in common with Romulus. On the death of the Sabine king, Romulus became sole ruler.

One time after a particularly successful battle with Veii, Romulus was holding a review of his army, when suddenly darkness covered the sky and a terrible storm arose. About the head of Romulus the lightning played most fiercely, and the people all fled in dismay. When the storm had passed and they returned, their king was nowhere to be found, and they believed that his father Mars had carried him off to the dwelling place of the gods. Under the name of Quirinus, he was worshiped as a deity. A.MC C.

ROOFS. Though used primarily for shelter, throughout history roofs have been an important part of architectural designs. The buildings of each country have been given individual character by their roof types. In North-



FOUR STYLES OF ROOFS
(*a*) Gable; (*b*) hip; (*c*) mansard; (*d*) gambrel.

ern climates, where the heavy snows of winter must be shed, the steeply-pitched roof and its companion, the pointed arch which characterizes Gothic architecture, have been developed. At the opposite extreme is the massive flat stone roof of rainless, ancient Egypt. Greek roofs were slightly inclined, and Roman roofs were sometimes flat, sometimes domed or vaulted. Japanese and Chinese, Moorish and Spanish, Romanesque and Byzantine roofs are equally distinctive. See illustrations accompanying the article ARCHITECTURE, page 322.

Materials for pitched roofs range from the sod thatch of Irish peasant cottages and the grass thatch of Malay huts to the wooden or slate shingles and the earthen tiles of more elaborate structures. For flat, or nearly flat, roofs, corrugated or sheet metal—iron, tin, zinc, copper or lead—or tar and gravel, asphalt or special composition of felt or rubber are found satisfactory.

If the height of the roof is one-half the width which it covers, it is said to have *one-half pitch*. Similarly, roofs are frequently one-third pitch, one-fourth pitch, and so on. The horizontal distance from the edge of a roof to a point beneath its peak is called the *run;* the perpendicular height of the peak above the edge is called the *rise*. In a one-half pitch, therefore, the run equals the rise.

Consult Merriman and Jacoby's *Roofs and Bridges;* Kidder's *Building Construction.*

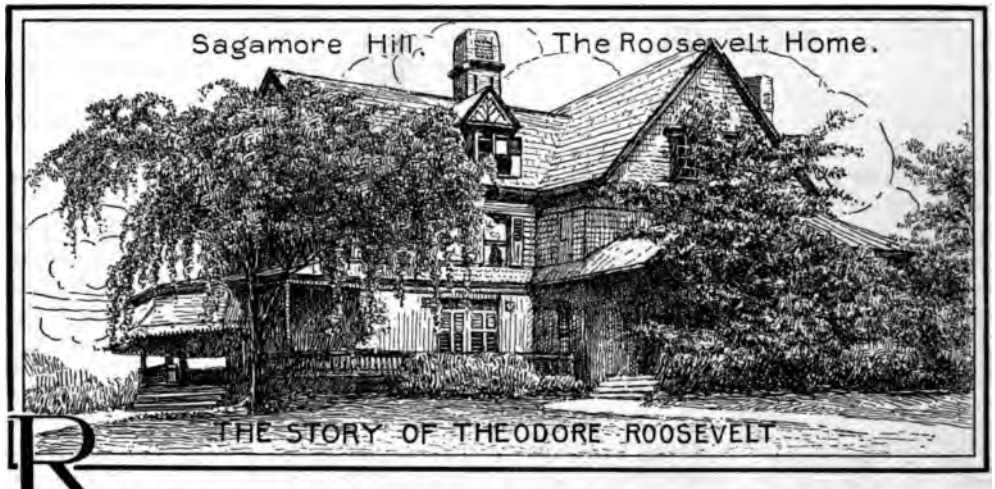
ROOK, the most common European member of the crow family, smaller than the raven and larger than the jackdaw. It differs from other members of its family by reason of the purple gloss on its black plumage, and in its habit of feeding entirely on insects and grain. Also, on coming to maturity it sheds the feathers of its face, which leaves it a grayish-white. The migrating habits of rooks vary, those in Central Europe remaining the year round in their settled place of abode, and those farther north flying southward on the approach of winter. At the nesting season they gather in communities of many hundreds, known as rookeries. When tamed, they sometimes learn to imitate human speech, and are known for their cunning and their thieving ways. The bird figures in English literature from the time of Chaucer. See CROW.

ROOK'WOOD POTTERY, a ware that is the best representative of American ideas and methods in pottery work. The institution where Rookwood pottery is made owes its inception to the experiments and influence of Mrs. Bellamy Storer. It is located in a suburb of Cincinnati, called Rookwood because of the many crows which frequent the woods in the vicinity. The factory, which was a former country home, is perched high on a hill and is as picturesque as the pottery itself. With American clays worked by American hands, Mrs. Storer determined to develop a distinctly American ware distinguished by an individual method of treatment.

Great progress has been made since the humble beginnings in 1880, when the first kiln of

Rookwood pottery was fired. The present institution is the successful outgrowth of those days of doubt and many obstacles. Most of the clays used are found in the Ohio Valley, notably at Buena Vista and Hanging Rock, Ohio, and in Tennessee and Virginia. These clays, when combined with artificial tints, produce the beautiful sea-green tones that characterize most of the Rookwood pottery of recent manufacture.

The products are divided into three classes—cameo ware, the dull-finished ware which is apparently unglazed, and the richly-glazed ware. With the exception of the primitive potter's wheel, practically no machinery is employed, since every effort is expended to produce original designs which cannot be developed by machinery. From the mixing of the clay to the withdrawal of the completed piece from the kiln, the ware passes through the hands of about twenty-five operators. Almost all the employees of the institution are Americans. Mrs. Storer's original plans have been faithfully followed, and Rookwood pottery has won a distinctive place in the ceramic arts of the twentieth century. See POTTERY. R.D.M.



THE STORY OF THEODORE ROOSEVELT

ROOSEVELT, *ro'zeh velt,* THEODORE (1858-), the twenty-sixth President of the United States, a unique figure in his generation, without doubt the most versatile man who has ever influenced American public life. An eager seeker for knowledge of all kinds, Roosevelt won distinction in many fields. Not merely must he be called a statesman, but he is always a reformer, and he is also a naturalist, a man of letters, a hunter and a sportsman. He stands in American thought as the representative of many of the great advances which his generation has made, and to an extraordinary degree his personality has impressed itself on the American people. He is an advocate of a busy life, the "strenuous life," it has been called. "Speak softly and carry a big stick" is a motto which will always be associated with him, just as conservation and opposition to race suicide and to nature faking will be.

As a man of letters he takes high rank for the excellence both of style and content. As a statesman he is too close to the men who want to judge him to receive fair treatment. First of all, he knows how to handle men—he is a very clever politician. But he is also a statesman, for he has vision, and the courage to make the visions real. John Morley, the English writer and statesman, returning to England after a visit to America, said that he saw two tremendous forces of nature while he was gone:

> "One was Niagara Falls, and the other the President of the United States, and I am not sure which is the more wonderful."

Roosevelt is essentially a man who does things, a man to whom the term *dynamic* is justly applied. Take him all in all, he is without doubt the most interesting political figure of his time in the world.

Theodore Roosevelt was born in New York City on October 27, 1858. He is descended, on his father's side, from a sturdy family of Dutch burghers, one of whom emigrated from Holland to New Amsterdam about 1650. For a century the Roosevelts (originally Van Rosenvelt) contracted no marriages outside their own nationality, and not until after the Revolutionary War did they begin to use English names

in place of the Jacobus, Johannas and Nicholas which were borne by the earlier members. The Roosevelts prospered. One owned real estate, others went into business, and before long they were numbered among the old aristocracy of New York.

Theodore Roosevelt, the President's father, was a successful business man who gave largely of his time and money to philanthropic enterprises of many kinds. His many generous activities were recognized by his appointment to

THEODORE ROOSEVELT

The millions who believe in him call him "Teddy." His opponents call him many things. His intense activity makes a neutral viewpoint almost impossible. Almost every person is either an enthusiastic supporter of Roosevelt or is violently opposed to him.

the New York State Board of Charities. President Hayes nominated him for collector of the port of New York, but the elder Roosevelt's independence in politics led the local bosses to bring influences to bear which secured his rejection by the Senate. President Roosevelt's father, and his uncle Robert (1829-1906) were both active in politics, and their lives were "a stirring summons to men of wealth, of culture and of leisure, to a more active participation in public affairs." The President's mother, who was Miss Martha Bulloch, belonged to a family as distinguished in Georgia as the Roosevelts were in New York. Mrs. Roosevelt's elder brother was a Confederate naval officer who was responsible for setting afloat the *Alabama* and other privateers and blockade runners, and a younger brother was navigating officer of the *Alabama*. Her great-grandfather was the first governor of Georgia after the Declaration of Independence was signed.

His Boyhood and Youth. Of a distinguished, aristocratic and wealthy family, young Roosevelt had many advantages in life. He had, however, the serious handicap of poor health, against which he had to fight until he reached manhood. As a boy he took all manner of gymnastic exercises, some of which seem to have carried him out on window ledges, to the alarm of the neighbors. But his mother used to say that "If the Lord hadn't taken care of Theodore he would have been killed long ago," and Theodore himself said in after years that he had made up his mind that, come what might, he would make himself strong. His schooling was occasionally interrupted by his weakness or by illness, but he made excellent progress, nevertheless, and entered Harvard in 1876.

At Harvard he was neither a "sport" nor a "grind." He belonged to exclusive societies, but also had many friends outside these small, select groups. He stood fairly well in his studies, but had ample time for boxing, wrestling, tennis and other sports. He was especially interested in natural history.

His Choice of a Career. After graduation from Harvard, young Roosevelt studied law at Columbia University and in the office of his uncle, but it seems that he had no serious intention of becoming a lawyer. The law was merely one kind of preparation for wider activities. At one time he wanted to be a professor of natural history, but he had no thought of becoming a professional writer. The year after he left college he wrote one book, *The Naval History of the War of 1812*, but he had done this rather to correct a number of errors which he had found in the histories dealing with that war. He made his entrance into politics in 1881, much to the amusement of his Fifth Avenue friends, who told him he would meet only the grooms and saloonkeepers in politics, to which Roosevelt replied that as "they are the governing class in this city, then, they must be better men than you are." He attended the meetings of the Republican ward club, and found that "the boys there were a jolly enough lot."

In the New York Legislature. In the autumn of 1881 Roosevelt was elected to the New York assembly. He was only twenty-three years old and the youngest man in the legislature, but he was soon one of the best known, both inside and outside of that body. There was a scandal concerning a certain judge. The political bosses ordered silence, but Roosevelt pressed the issue, and after a week of talking secured the impeachment of the judge. Roosevelt was reëlected for three more terms. In

1883 he received the vote of the Republicans for speaker, an honor which made him the leader of the minority. Before long, however, the bosses found that "he would not listen to reason," and they found a new leader. Roosevelt himself has said that this sudden desertion taught him his first real lesson in politics:

"It was just this; if you are cast on a desert island, with only a screw-driver, a hatchet and a chisel to make a boat with, go make the best one you can. It would be better if you had a saw, but you haven't. So with men. There is a point, of course, where a man must take his stand alone and break with all for a clear principle, but until it comes, he must work with men as they are."

Although defeated for speaker, and in disfavor with the bosses, Roosevelt was the most influential man in the assembly, and was already a power to be reckoned with. In 1884 he refused to accept another nomination for the legislature, but he attended the state Republican convention, which by shrewd tactics he and his friends managed to control. He was elected a delegate-at-large to the national convention, and the other delegates made him, a young man just twenty-five years old, the chairman of the delegation from the Empire state. Theodore Roosevelt was a national figure. He worked hard to secure the nomination of George F. Edmunds for President, and bitterly opposed Blaine, but after Blaine was nominated Roosevelt finally decided to vote for him.

Ranch Life. The year 1884 was a hard one for Roosevelt. His mother died in February; and two days later his wife passed away. He had married in 1880, on his birthday, Miss Alice Lee, of an old Boston family. These domestic sorrows and his political defeats turned his mind from politics. He had previously enjoyed many camping experiences in the Maine woods, but now he turned to the Western prairies. He bought a ranch on the Little Missouri, in North Dakota, and made ranching his business. The brand of his Elkhorn Ranch, as he called it, was the Maltese cross. The young master of Elkhorn Ranch—courageous, frank, ready to bear his share of work and hardship—soon won the respect of the hard men of the Bad Lands. They forgave him his aristocratic ancestry, his New York manners, his Harvard English, his gold-rimmed eye-glasses and even his fringed Angora "chaps," of a kind seldom seen except on the stage. Once he said to a braggart who boasted of the number of men he had killed, "Jim, I like you; but you are the nastiest talking man I ever heard." And Jim, instead of drawing a gun, admitted apologetically that "mebbe I have been too free with my mouth."

Back in Politics. Roosevelt spent the winters of 1884-1885 and 1885-1886 in New York, so he was not entirely out of touch with political affairs. He spent his vacations on the Elkhorn Ranch for a few years more, but his active ranching career ended in the autumn of 1886. He was at Elkhorn when the Independents and the Republicans nominated him for mayor of New York. Opposing him were Henry George, the Single-Taxer, and Abram Hewitt, the Democratic candidate. There was little chance of election, but Roosevelt conducted a lively canvass and felt no disappointment when Hewitt was elected. In December following this defeat, Roosevelt married Miss Edith Kermit Carew, a childhood friend.

After a honeymoon in Europe, Roosevelt returned to New York and renewed his political connections. In 1888 he went on the stump for Harrison, who rewarded him by giving him a place on the Civil Service Commission. While Roosevelt was a member the Commission adopted many measures aimed to bring public employment within reach of the people of all sections and of all parties. It began the practice of holding examinations throughout the country for clerkships in Washington, and greatly extended the scope of the civil service on the basis of "applied idealism," as Roosevelt called it.

President of the New York Police Commission. After serving on the Civil Service Commission from 1889 to 1895, Roosevelt resigned to become president of the police board of New York City. For the next two years he labored to eradicate corruption from the police force and to secure enforcement of the laws. Roosevelt was only one of four members of the board, but he was held responsible by the public for its entire work. He stopped the system, hitherto recognized, by which police officers won promotions by paying money to "the man higher up." Roosevelt was not a mere desk official. He kept in touch with the men on the streets, and any policeman might expect that at the next corner he would find himself face to face with his chief. At midnight or in the early hour of the morning the chief would sometimes appear and ask

questions. It was at this time that the cartoonist first introduced to national attention the now familiar shining teeth. A scared policeman, "seeing things at night" in the form of two rows of teeth glistening in the darkness, was a favorite subject for cartoonists.

In the Navy Department. In April, 1897, President McKinley recalled Roosevelt to Washington to become Assistant Secretary of the Navy. Roosevelt already foresaw the likelihood of a war with Spain, and he set about to put the navy in readiness. One of his first tasks was the reorganization of the system of ranking and promotion among naval officers. Target practice was one of his hobbies. To Roosevelt belongs most of the credit for whatever preparedness the American navy possessed when the war broke out. But when the war actually came Roosevelt gave his services to the nation in another capacity.

The Rough Riders. He resigned from the Navy Department in April, 1898, after he had taken the initial steps to raise the first United States Volunteer Cavalry, which was nicknamed "the Rough Riders." These riders were a remarkable lot. Most of them were plainsmen—cowboys. There were Cherokee Bill, Smoky Moore, Rattlesnake Pete, Happy Jack and others with interesting names. There were a few Indians, and an ex-city marshal from Dodge City, Kan., whose ear had been, as he explained, "bitten off." A sharpshooter from the Carolina mountains and a bear hunter from Wyoming rode side by side with "cow-punchers," stage drivers and miners. And there was McGinty, a famous "broncho buster," who could not keep step on parade for the simple reason that he had almost forgotten how to walk. There was, too, a sprinkling of Easterners, many of them college men, and there were New York policemen, eager to serve again under the ex-commissioner.

Of the motley crowd Roosevelt was at first lieutenant-colonel; Leonard Wood was colonel. Later, when Wood was made a brigadier-general, Roosevelt rose to the command, and as colonel of the regiment he led the famous charge up San Juan Hill, a charge which made the Rough Riders immortal and made Roosevelt a popular idol. (See SPANISH-AMERICAN WAR.)

Governor of New York. The Spanish-American War was only a little war, but it made Roosevelt governor of New York. The Republican party was in dire straits, and it needed new men. The "machine," headed by Senator Platt, the political "boss" of the state, agreed on Roosevelt as a savior. Without attempting concealment Roosevelt discussed the matter with Platt, much to the alarm of some reformers, who feared needlessly that he might be led astray. Roosevelt was nominated without giving pledges, and was elected by a plurality of 18,000 votes over the Democratic candidate, Augustus Van Wyck.

As governor he made a remarkable record. He worked with men of all kinds, reformers as well as machine politicians, and in almost every case got what he wanted. He directed an investigation of the state's canal system, about which there had been much talk of fraud, and persuaded the legislature to vote an appropriation for a systematic survey of needed improvements. He incurred the hostility of large corporate interests by approving a bill providing for the taxation of corporation franchises. Far from obeying the orders of the "machine," Roosevelt had made the "machine," in most instances, do as he wished. He, too, was a politician, he knew how to handle men and issues, but he did it honestly. Yet he was too troublesome a man, and the politically powerful determined to render him harmless by making him Vice-President, a political tomb from which no man had emerged with power for half a century. Senator Platt later asserted openly that he got rid of Roosevelt by forcing him to accept the nomination for Vice-President.

Roosevelt wanted to be governor of New York for a second term, but he finally agreed to accept the Vice-Presidency, for which the Republican convention nominated him by acclamation. In the campaign Roosevelt took an important part; he delivered nearly 700 speeches and contributed largely to the success of the ticket. McKinley and Roosevelt received 292 electoral votes to 155 for Bryan and Stevenson.

The Administration of Theodore Roosevelt

Six months after his inauguration as Vice-President, Roosevelt became President of the United States through the assassination of William McKinley. He was only forty-three years old, the youngest man who has ever become President. President Roosevelt retained the late President's policies. McKinley's plans for trust regulation, for reciprocity with other

countries, for government of the Philippines and for other policies were all advanced. So striking was the President's personality, so tremendous his influence, that his character was the chief issue in the campaign of 1904. The President said frankly that he wanted to be elected to serve a full term. He was nominated by the Republican convention by acclamation, and his election was a foregone conclusion. He defeated Judge Alton B. Parker, the Democratic candidate, by a popular majority of nearly 2,000,000 votes, and received 336 electoral votes to 140 for Parker. In his second administration he pursued in a general way the policies outlined during his first term, and the seven years and six months for which he was President constitute a single unit.

Important Legislation. During the whole of his two terms President Roosevelt wielded a tremendous influence on Congressional legislation. He advocated a larger army and navy, and one of the first important laws passed

ELECTION MAP OF 1904

States marked with lines gave their electoral votes to Roosevelt; states appearing in solid black were Democratic, supporting Parker. The white areas north of Mexico were then nonvoting territories.

reorganized these two branches. A general staff was created for the army in 1903, and a program of more rapid construction was adopted for the navy. About the same time Congress passed a new Chinese Exclusion Act and the Reclamation Act, the latter providing for the reclamation and irrigation of the arid lands of the West. Congress in 1902 made the Census Bureau a permanent branch of the government and in 1903 created a new department, that of Commerce and Labor. The Hepburn Railway Rate Act of 1906, the Federal meat inspection act and a pure-food law of the same year, the establishment of a Bureau of Immigration, a uniform naturalization law, a law increasing the salaries of the Vice-President, the Speaker and members of Congress, and, finally, the Aldrich-Vreeland Act of 1907—these are the most important laws of Roosevelt's terms. During these seven and a half years the President's support of many radical reforms alienated the more conservative members of his party, and especially in the closing years of his term there was bitter antagonism between them and him.

Foreign Relations. During the whole of President Roosevelt's administration foreign relations presented many knotty problems. For the most part these involved South or Central American republics. By far the most important concerned the Panama Canal. The Hay-Pauncefote Treaty (which see) was ratified on December 16, 1901. Two years later, after Colombia had rejected a treaty for the construction of a canal, the state of Panama revolted and was immediately recognized as an independent republic by the United States; it promptly granted to the United States the canal rights it sought. There is some evidence that the President was directly concerned in the revolt of Panama, but his action was generally approved by public opinion, and the acquisition of the Canal Zone was without question the greatest material achievement of the Roosevelt administration.

Less important in its results, but more threatening at the time, was the Venezuelan complication. Great Britain and Germany sent a joint naval expedition to force Venezuela to pay certain claims which they held against it. The bombardment of the Venezuelan ports was about to begin when President Roosevelt called on the two powers to submit their claims to arbitration. After tedious negotiations relations between Great Britain and the United States were further smoothed out by the action of the Joint High Commission in finally disposing of the Alaska boundary dispute. In San Domingo in 1907 the attempt of the European powers to enforce certain claims led the United States to assume a sort of financial protectorate over the island republic, American officials being used to collect customs duties and pay San Domingo's foreign debts with the net proceeds.

A reciprocity treaty was negotiated with Cuba in 1903. In 1906 an American provisional government was established in that island as the result of an insurrection. As soon as order was restored authority was turned back to the Cubans. The most remarkable episode in foreign relations, however, was the President's ac-

ROOSEVELT'S ADMINISTRATION
1901 1909

Navy Goes Around the World

Louisiana Purchase Exposition

Jamestown Exposition, Commemorating Old Jamestown

San Francisco Disaster

Pacific Cable Laid

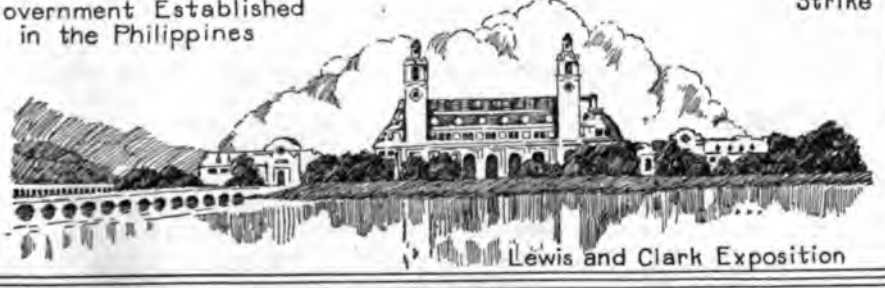
Panama Canal Started

Cleveland Died, 1909

Government Established in the Philippines

Russia Japan
Treaty at Portsmouth

Anthracite Coal Strike



Lewis and Clark Exposition

tion in bringing together the Russian and Japanese peace commissioners, and thus being directly responsible for the conclusion of the Russo-Japanese War in 1905. In the next year the Nobel Prize for peace was awarded Roosevelt for his services to the world in ending this war. The successful cruise of an American battleship fleet around the world and the laying of the Pacific cable to Hawaii and the Philippine Islands were also of great importance in disclosing the degree of preparedness possessed by the United States. The dramatic voyage of the fleet was conceived and inspired by him, although naval experts predicted disaster for the ships, and its moral effect on the nations of the world was tremendous.

Antitrust Movement. One of the most important tendencies of the last years of the nineteenth century was the agitation against trusts. President Roosevelt's administration was marked by special activity in this direction, notably against common carriers. As a result of investigations carried on by the Bureau of Corporations in the Department of Commerce and Labor, the government brought suit against the Northern Securities Company, a holding company which owned the controlling interests in the Great Northern and the Northern Pacific railways. The Securities Company was ordered dissolved by the Supreme Court in 1904. Similar suits were instituted and convictions obtained against the so-called "beef trust" and other monopolistic groups. Indictments for receiving or granting rebates were voted against the Standard Oil Company, the New York, New Haven & Hartford Railway and other railways and industrial corporations. The air was constantly filled with rumors of further attacks upon "big business," and there was much criticism of the President for the encouragement he was said to be giving to possible industrial and financial disturbances. In fact, in 1907, the country suffered from a sharp financial crisis, which did not, however, leave a serious effect on industry.

Strike of Coal Miners. Although not directly connected with the antitrust agitation, a great strike of the anthracite coal miners in 1902 was symptomatic of the industrial unrest which pervaded the country. The strike lasted the whole summer, and the country faced a coal famine. The miners refused to return to work unless the owners would submit the questions in dispute to arbitration, but the owners declined to meet those demands. The President, in this crisis, called the representatives of the owners and the miners together in conference. The owners at first declined to consider arbitration, but within two weeks, when the public was aroused at the spectacle of the President's discomfiture, they agreed to it, provided the President would name a commission. The President at once named three men, Judge George Gray, Bishop John L. Spalding and Carroll D. Wright. This commission decided all questions at issue, and made peace in the anthracite coal industry.

Other Affairs. Roosevelt's term was marked by three anniversary expositions—the Louisiana Purchase at Saint Louis in 1904, the Lewis and Clark at Portland, Ore., in 1905, and the Jamestown Tercentennial at Hampton Roads, Va., in 1907. (Each of these expositions is described in a special article in THE WORLD BOOK.) In April, 1906, occurred the disastrous San Francisco earthquake and fire, which made 200,000 homeless and caused a property loss of about $500,000,000.

An event of international importance was the laying of the Pacific cable, the first American cable across the Pacific, in 1903. This cable is 7,846 nautical miles long, and touches at Guam, Hawaii and the Philippine Islands. It was later extended from Manila to Japan and to Shanghai. Oklahoma was admitted as a state in 1907. An interesting event was the adoption by Wisconsin, in 1903, of the first state-wide primary-election law for the nomination of elective officials.

The Election of 1908. It was generally understood that President Roosevelt favored Secretary-of-War Taft as his successor. Taft was nominated, and he was elected by an electoral vote of 321 to 162 for William Jennings Bryan (see TAFT, WILLIAM HOWARD), his election being due largely to Roosevelt's influence.

The Most Interesting American

African Explorations. The biographies of most Presidents come to a more or less sudden termination as soon as they leave office. Not so with President Roosevelt. When he retired from the Presidency in 1909 he was in the full vigor of middle life. He was a few months past fifty, physically and mentally as active as when he began his first term. Long walks, tennis and horseback riding—his three favorite forms of exercise—had kept him full of energy.

OUTLINE AND QUESTIONS ON THEODORE ROOSEVELT

Outline

I. Years of Preparation

(1) Ancestry and birth
(2) Boyhood and youth
(3) Education
(4) Law study
(5) Early political activities

II. A National Figure

(1) Assistant Secretary of the Navy
(2) In Spanish-American War
(3) Governor of New York
(4) Elected Vice-President

III. His Administration

(1) Death of President McKinley
(2) Legislative affairs
  (a) Reorganization of army and navy
  (b) Chinese Exclusion Act
  (c) Reclamation Act
  (d) Department of Commerce and Labor created
  (e) Railway Rate Act
  (f) Bureau of Immigration established
  (g) Pure-food law
  (h) Antitrust legislation
(3) Foreign affairs
  (a) Panama Canal question
  (b) Venezuela controversy
  (c) San Domingo
  (d) Reciprocity with Cuba
  (e) Insurrection in Cuba, and American provisional government
  (f) Treaty of Portsmouth
  (g) Cruise of United States fleet around the world
(4) Internal affairs
  (a) Anthracite coal strike
  (b) Expositions
    1. Louisiana Purchase
    2. Lewis and Clark
  (c) San Francisco earthquake and fire
  (d) Laying of Pacific Cable
  (e) Admission of Oklahoma

IV. Later Life, and Character

(1) African explorations
(2) Breach with Republican party
(3) Formation of Progressive party
(4) South American travels
(5) Activities during War of the Nations
(6) Character summary
(7) Publications

Questions

What actions of the President's alienated the conservative members of his party during his administration?

What handicaps did Roosevelt have to overcome in his youth?

Why can he be called with justice the "most versatile man who has ever taken a part in American public life?"

In what way, besides his actual participation in the struggle, did Roosevelt help to win the Spanish-American War?

What unusual honor was shown him when he was twenty-three years old? When he was twenty-five?

How did he sum up his ideas of the methods to be employed in dealing with men in politics?

How did the cartoons current during his term as president of the police board show his attitude toward his work?

When was he elected to a high office that his party might be rid of him?

When did he, according to good authority, help to foment a revolution, and what was the general opinion concerning his action?

What two exploring trips did he take after his terms as President, and what did he accomplish on each one?

If ever there was an "apostle of energy" it was Roosevelt. Inactivity for him was impossible.

Immediately after the close of his term Roosevelt sailed for Africa with a party including his son Kermit and a number of naturalists. The object of the expedition was not merely sport, to hunt big game, but also to secure specimens for the zoölogical collection of the Smithsonian Institution at Washington. *African Game Trails* is the record he wrote of this year in the wilderness. His return to the United States by way of Europe in the spring of 1910 was a sort of triumph. Roosevelt delivered lectures at the Sorbonne, at Paris, and at the universities of Berlin, Christiania and Oxford. He met Emperor William II and King George V and was fêted and honored everywhere.

Breach in the Republican Party. While Roosevelt was away there occurred the Ballinger-Pinchot Controversy (see PINCHOT, GIFFORD). This controversy was merely one of the signs which indicated how widely the radicals and insurgents in the Republican party had become separated from the conservatives. On his return from Africa Roosevelt at first took no part in politics. Later in the year, however, he made a speaking tour of New York in support of Henry A. Stimson, the Republican candidate for governor, and about the same time he let it become known that he supported Pinchot, not Ballinger. President Taft had supported Ballinger, one of the circumstances which had made him the leader of the conservative Republicans. Between 1910 and 1912 the breach between the two leaders rapidly widened, Roosevelt continually advocating new and radical reforms, such as the elimination of the "twilight zone" which surrounded the powers of the Federal government, the introduction of the initiative, the referendum and the recall of judicial decisions as well as of judges, and a large degree of military and naval preparedness.

Taft, on the other hand, became increasingly conservative, and as the election of 1912 drew near the struggle between the two elements for control of the party became intense. Roosevelt at first supported La Follette for the Republican nomination, but later sought it for himself, in spite of the two-term custom. The story of the Republican convention of 1912 is told elsewhere (see TAFT, WILLIAM HOWARD). The Roosevelt delegates were unsuccessful in their attempts to get control of the convention. Claiming that the "steam roller" had run over them, that their rights had been ignored, and their votes "stolen" from them, the Roosevelt delegates finally withdrew from the convention, and held one of their own. Out of this secession grew the Progressive party (which see). The campaign was bitter, the Republicans and the Progressives both indulging in violent personal attacks on the characters of the candidates. Three weeks before the election, while entering his carriage to deliver an address at Milwaukee, Roosevelt was shot by an irresponsible man but was not seriously wounded. With characteristic courage, he continued his way to the hall, delivered his address, and then allowed the physicians to take charge of him. For the last weeks of the campaign Roosevelt lay in a hospital, recuperating. The election showed the former President's amazing strength with the people. The Republican party was split into two sections of nearly equal strength; Roosevelt received 4,119,507 votes; Taft, 3,484,956. Wilson, the Democratic candidate, received the entire vote of his party, polling 6,293,019 votes.

Exploring Again. After the election Roosevelt made an exploring trip into the interior of Brazil. There he discovered a hitherto uncharted river, formerly known as the River of Doubt. It is now called Rio Téodoro, in his honor. In South America Roosevelt made speeches in several of the larger cities, and helped to strengthen the friendly feeling existing between the two continents.

President Wilson's Chief Critic. Beginning in 1913 and continuing until 1917, when the United States entered the War of the Nations, Roosevelt was much in the public eye as the chief critic of President Wilson's foreign policy, first towards Mexico and later toward Germany. He objected especially to the "watchful waiting" policy. When the War of the Nations broke out Roosevelt at first declared that the United States had no reason for interference, but later he recognized the vast responsibilities resting on the United States. Especially after the sinking of the *Lusitania* he was vehement in his demands that the President resort to force. When finally war was declared against Germany, Roosevelt wanted to lead a volunteer brigade to France without waiting for the mobilization of the new national army to be raised by conscription. An act of Congress authorized the President to enrol such a volunteer brigade, but President Wilson decided that it was better to wait for the regular army. It is worthy of note, how-

ever, that Roosevelt's four sons all volunteered for service and went to France.

Roosevelt as Man of Letters. His literary work is of high character, and is itself sufficient to have given him a wide reputation. His writings have been collected in twenty-five volumes, ranging from scholarly historical essays or biological studies to entertaining narratives of his personal experiences. He was, in 1912, president of the American Historical Association and he was the thirteenth man elected to the American Academy of Arts and Letters. From 1909 to 1914 he was a contributing editor to the *Outlook;* later he had a brief association with another popular magazine, the *Metropolitan,* and in September, 1917, he became an editorial contributor to the Kansas City *Star.*

Of his many books the following are most important, some of them being standard works in their respective fields: *The Naval War of 1812,* written in 1882; *Life of Thomas Hart Benton* (1887); *Life of Gouverneur Morris* (1887); *The Winning of the West,* in four volumes, which appeared from 1889 to 1896; *History of New York City* (1890); *American Political Ideals and Other Essays* (1897); *The Rough Riders* (1899); *Life of Oliver Cromwell* (1900); *The Strenuous Life* (1900); *True Americanism,* a collection of his addresses delivered in Europe in 1910; *The New Nationalism,* a discussion of political ideals of the day, a book whose title became a current phrase in popular speech; *History as Literature and Other Essays* (1913); *Through the Brazilian Wilderness* (1914); *Life Histories of African Game Animals* (1914); *America and the World War* (1915). W.F.Z.

Consult Roosevelt's *Autobiography;* Riis' *Theodore Roosevelt the Citizen;* Burroughs' *Camping and Tramping with Roosevelt;* Morgan's *Theodore Roosevelt, the Boy and the Man;* Washburn's *Theodore Roosevelt.*

ROOT, in mathematics, a number or quantity which, when multiplied by itself one or more times, produces a given number or quantity. For example, since $2\times2=4$, 2 is a root of 4; again, since $3\times3\times3=27$, 3 is a root of 27. The various phases of this subject are discussed fully in these volumes in the articles EVOLUTION; INVOLUTION; SQUARE ROOT; CUBE ROOT.

ROOT, ELIHU (1845-), an American lawyer, statesman, diplomat and administrator who is credited by his fellow citizens with the possession of "the best brain in the United States." He became so dependable a lawyer that corporations have been willing to pay him thousands of dollars in a single fee for his opinion expressed in one word, "Yes," or "No." His eminence in corporation law has earned for him the distrust of those who profess to believe that a man cannot serve great private interests and at the same time be true to a public trust. Root's career has disproved this implication, for few men have given as disinterested service to their country as he, regardless of its effect upon his personal fortunes.

ELIHU ROOT

Elihu Root was born at Clinton, N. Y., the seat of Hamilton College, in which school his father was professor of mathematics. There the young man received a classical training, after which he was graduated in law at New York University. He earned money for his law course by teaching in Rome (N. Y.) Academy in 1865. Since then thirteen universities have conferred honorary degrees upon him.

He was admitted to the bar in 1867, and began the practice of law in New York City in the same year. Not until 1883 did he enter public service. In that year he became United States District Attorney for the Southern District of New York, which post he resigned in two years because the kind of legal service involved was not to his liking. A brief summary of his later public activities includes the following important commissions and honors:

He was a delegate-at-large to the New York state constitutional convention in 1894, and served as chairman of its judiciary committee. Twenty-one years later, at the state constitutional convention of 1915, at the age of seventy, he was president of that body.

Upon the retirement of Russell A. Alger as Secretary of War in the McKinley Cabinet, in 1899, Root became his successor. He continued in the position under Roosevelt, until 1904. In this office he planned the War College; reorganized the system of administration of the Department, instituted the General Staff and enforced civil service rules, as far as can be made practicable, for promotions. Alger left the Department in disorder, after the scandals incident to the Spanish-American War; Root was highly praised for the ability with which he restored order and for his administrative genius, which showed in the military plans he laid for the con-

duct of the armies then stationed in Cuba and the Philippines. While Secretary of War he served on the Alaska Boundary Commission (see page 143).

For a year he practiced law, then in July, 1905, was appointed Secretary of State in the Roosevelt Cabinet, succeeding John Hay. This post was relinquished early in 1909, for he had been elected by the New York legislature as a United States Senator.

He entered the Senate in March and declared at once his intention not to seek a second term and accordingly returned to private life in 1915. During his term as Senator he was counsel for the United States in the North Atlantic fisheries arbitration (1910); was appointed in 1910 as a member of the Permanent Court of Arbitration at The Hague; and in 1913 was made president of the trustees of the Carnegie Institution at Washington.

The Nobel Prize for Peace for 1912 was awarded Mr. Root (see page 4243).

His next public service was again international in character. In 1917 he became chairman of an American commission to the new republic of Russia, by appointment of President Wilson. It was the delicate duty of the commission to do all possible to unite the discordant elements of Russia for vigorous prosecution of their part in the War of the Nations, to help organize political and industrial life and to pave the way for such American help as might be required, including heavy financial aid. E.D.F.

ROOT, GEORGE FREDERICK (1820-1895), an American composer, was born at Sheffield, Mass. He studied music in Boston and in 1844 went to New York City, where for some years he was organist in the Church of the Strangers. In 1859 he organized the music-publishing firm of Root & Cady in Chicago, and just after the beginning of the War of Secession made a fortune through the publishing of patriotic songs, mostly of his own composition. Among these were *Tramp, Tramp, Tramp, the Boys Are Marching,* of which more than 500,000 copies were sold, *The Battle Cry of Freedom* and *Just Before the Battle, Mother.* His quartette, *There's Music in the Air,* also gained much popularity. These songs, while not possessing great musical or literary merit, had considerable vigor and came at a time when all efforts to increase American patriotism were cordially welcomed. Among his compositions of a much higher quality were the cantatas *The Pilgrim Fathers* and *Belshazzar's Feast.*

ROOTS constitute one kind of the three vegetative organs essential to plant growth, the others being the stems and the leaves. The chief functions of roots are to hold plants in their places in the soil and to supply them with water. The first formed roots, those that grow directly from the rudimentary stem (see GERMINATION), are called *primary;* branches of the primary roots are called *secondary,* and branches of these, *tertiary.* Roots which grow on the stem or in other unusual places are known as *adventitious.* In most cases the root system divides and subdivides until the smaller rootlets are covered with tiny *root hairs.* These play an important part in the development of the plant by taking up water from the soil.

According to the medium in which they grow roots are classified as *soil, aerial* (or *air*) and *water* roots. Air roots are sometimes developed by plants which are anchored in the ground, as in case of the poison ivy, but there are other plants which grow entirely in the air, as many kinds of orchids. The water hyacinth and the floating duckweed are examples of plants that have roots adapted to live in water. Roots that derive nourishment from other plants are called *parasitic;* such are the roots of the dodder and the mistletoe.

Roots are also distinguished in regard to form. A primary root which grows to be much larger than any of its branches is called a *taproot,* and if this taproot becomes much thickened and develops as a storehouse for nourishment, as in case of the carrot or turnip root, it is said to be *fleshy.* A cluster of thickened primary roots, such as those produced by the sweet potato and dahlia, would be called *fasciled* roots. Thread-like roots, such as those of grass, are *fibrous.* In regard to their length of life roots are classified as *annuals, biennials* and *perennials* (terms explained in these volumes under their respective headings).

Related Subjects. For the picture of a young root system see page 2482, under GERMINATION. On page 1587, in the article CORN, there is a diagram showing how roots and their branches penetrate the soil. How roots often grow much farther below ground than the stem does above ground is illustrated under DANDELION, page 1698. See also in the article BOTANY pictures of parasitic plants (page 859) and of fleshy roots (page 860).

ROPE. The distinction between a rope and a cord is in the size alone. The term *rope* is applied to a cord one or more inches in diameter, and the term *cordage* to all smaller cords down to the size of binder twine, excepting ropes made of wire. Ropes vary in size from those an inch in diameter to the huge ship cables more than fifteen inches in circumference.

Hemp, including manila and sisal, also flax, jute, cotton and coir, the latter being the fiber from the husk of the cocoanut, are the materials used in the manufacture of ropes. Manila

hemp, which is obtained from the Philippine Islands, is the material most extensively used. Sisal is obtained from Yucatan and is sometimes called Yucatan, or Mexican, hemp. Jute comes from the East Indies and from some parts of Russia. The manila hemp is preferred for all cordage where strength is required, because its fibers are longer and stronger than those of sisal or jute. Cotton makes the strongest rope, but its use is limited because of its expense.

Manufacture. The processes in rope making are practically the same for all materials, and with few exceptions the work is all done by machinery. Hemp is received at the factory in bales averaging about 270 pounds each. The fiber is taken from the bales, loosened, and sprinkled with oil. It is then passed in layers through a machine called a *spreader.* From the spreader the hemp passes to the *breaker,* which straightens out the fibers and arranges them in a ribbon called the *sliver.* The sliver passes through several breakers, each finer than the other, until the fiber is prepared for spinning. As the fiber is spun into yarn it is wound on large bobbins holding about 1,000 yards each. The yarn is twisted into strands, and the strands are twisted into a rope.

The smaller ropes consist of three strands; this number is increased for larger ropes. Cables used in drilling wells vary in size from one and three-fourths to two and seven-eighths inches in diameter and in length from 1,400 to 3,500 feet; these are made by twisting together three strands of manila rope. Such cables are light, strong and flexible.

Strength of Ropes. The strength of a rope depends upon its size and the material of which it is made. A hemp cord 1.53 inches in circumference will withstand a strain of 1,670 pounds. One 6.9 inches in circumference will lift a weight of 33,808 pounds. A cotton rope 6.51 inches in circumference will lift a weight of 23,258 pounds.

Wire Ropes. Wire ropes are made of a certain number of wires twisted together, steel wire making a considerably stronger rope than iron wire. The twisting is done in the same manner as in laying the strands of a hempen rope. Wire ropes are extensively used for cables, for the rigging of ships and in derricks for lifting heavy weights, and for many other purposes they have entirely displaced fiber ropes. W.F.R.

RORQUAL, *rawr'kwahl,* the largest and most numerous group of whales, species of which are found in all waters. The rorqual has a head comparatively small and flat, a long, slender body, a tail much compressed before widening into "flukes," short flippers, a dorsal fin and a throat arranged in folds. The blue whale, largest of known animals, is a rorqual. It sometimes reaches a length of from eighty to one hundred feet, and has sixty-four vertebrae, sixteen of which bear ribs. The whalebone of the rorqual whales is small in quantity and of poor quality, and the blubber is less abundant than in other whales. See WHALE.

ROSAMOND, *roz'a mund* (about 1140-about 1176), the mistress of Henry II of England, generally known as "fair Rosamond." Most of the stories told concerning her are mere legend; there is not even definite information as to who her father was nor as to the length of time she was Henry's mistress. In later centuries there grew up romantic tales of a woodland bower built at the center of a labyrinth through which her royal lover was guided by a clue; and fourteenth-century chroniclers declared that she died of poison administered by Eleanor, Henry's queen. She was buried in the nunnery church of Godstow, but in 1191, Hugh, Bishop of Lincoln, had her body moved to the chapter house.

ROSA, MONTE, *ro'zah, mohn'tay.* See MONTE ROSA.

ROSARIO, *ro sah'ri o,* a rapidly-growing city on the Paraná River, in the northeastern part of Argentina, South America. It is situated 175 miles northeast of Buenos Aires, the largest city on the continent, and is second to that place in size among Argentine cities. Rosario is an important port for river and foreign trade, as well as one of the foremost railway centers in the province of Santa Fé, and exports large quantities of grain, flour, sugar, wool and meats. The city has the largest sugar refinery in Argentina, besides flour mills, breweries and factories producing a variety of commodities. Rosario has fine schools and hospitals and a cathedral, and is healthful and up-to-date. Population in 1915, estimated, 220,000.

ROSARY, *ro'za ri,* a string of beads, made of wood, pearl or stone, by which prayers are counted. The rosary commonly used in the Roman Catholic Church consists of a circle of fifty small beads, divided into equal sections by four large beads. A pendant is attached which has two large beads, three small ones and a crucifix. On the large beads are said the *Pater Nosters;* on the small ones, the *Ave Marias,* and on the crucifix the *Apostles' Creed.* During the recitation of the rosary, the various mysteries of the faith are meditated upon, and at the conclusion of each group of *Ave Marias* a doxology is said. The complete rosary consists of three

recitations of the ordinary rosary, during which there is a reflection upon fifteen mysteries. Saint Dominic is credited with introducing this form of devotion into the Roman Church. Mohammedans and Buddhists also make use of beads in their prayers.

The Song. One of the songs of the present generation which has touched the hearts of the people and bids fair to become a permanent addition to the world's music is *The Rosary,* composed by Ethelbert Nevin (which see). The words, by Robert Cameron Rogers, are given a remarkably harmonious musical setting. They are as follows:

The hours I spent with thee, dear heart,
Are as a string of pearls to me;
I count them over ev'ry one apart,
My rosary, my rosary!
Each hour a pearl, each pearl a pray'r
To still a heart in absence wrung:
I tell each bead, unto the end,
And there a cross is hung!
O memories that bless and burn!
O barren gain and bitter loss!
I kiss each bead, and strive at last to learn
To kiss the cross, sweetheart! To kiss the cross.

ROSE, a name that has come to be a symbol of fragrance and loveliness, borne by a genus of flowers found in all parts of the north temperate regions, and unsurpassed in beauty of form and color. No flower name brings to the mind more varied and more beautiful pictures than this—pictures of the sweetbrier, the loveliest wild flower of the country roadsides; of its delicately-reared cousin, the fragrant American beauty, whose rich red petals are so soft and smooth they seem to be made of velvet; of white and yellow roses and roses showing every shade of pink and crimson. References to the rose in literature and poetic tributes to this flower are numberless. The one which follows is typical, and is from the pen of Thomas Moore, who also wrote that favorite rose song, *The Last Rose of Summer:*

Rose! thou are the sweetest flower
That ever drank the amber shower;
Rose! thou art the fondest child
Of dimpled Spring, the wood-nymph wild.

Of the wild rose it has been said that—

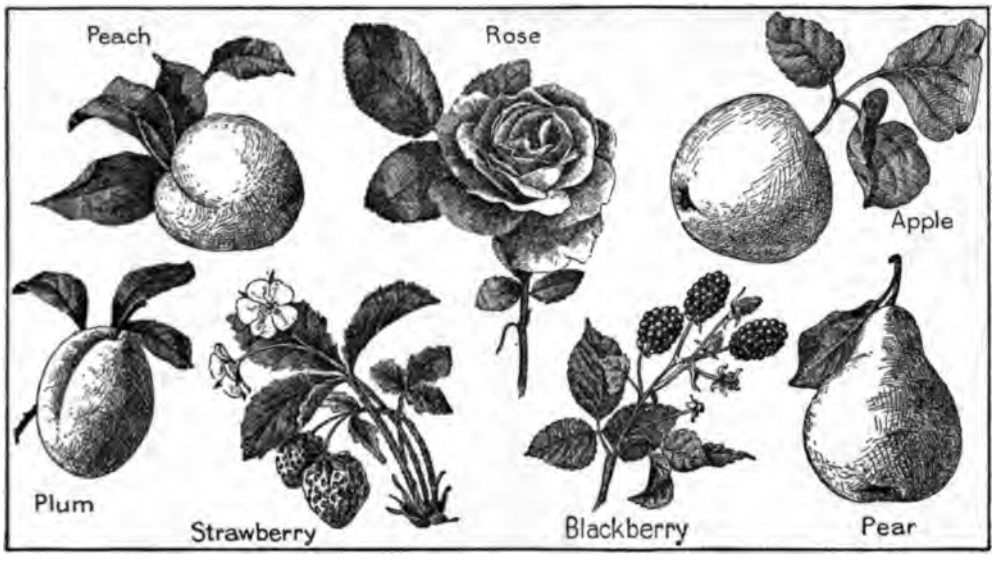
Our sweet, autumnal western-scented wind
Robs of its odors none so sweet a flower,
In all the blooming waste it left behind,
As that the sweetbrier yields it.

In English history a red and a white rose were the respective emblems of the rival houses of Lancaster and York (see ROSES, WARS OF THE). How England came to adopt the red rose as its national emblem is told in these volumes in the subtitle *National Flowers,* under the heading FLOWERS. Persia has for its national flower the Cherokee rose, a white Chinese rose that flourishes in the Southern United States; this is the state flower of Georgia. New York also has adopted the rose as its state flower (see subtitle *State Flowers,* in article FLOWERS, and also subtitle *Language of Flowers*). Roses flourish particularly well in mild climates like those of Southern France and the Pacific coast regions of the United States. In Portland, Ore., which is preëminently a "Rose City," a day in June is set aside each year for the celebration of the carnival of roses, and this custom is followed in other cities of the West.

Kinds of Roses. The rose genus has given its name to one of the most important families of the plant kingdom (see *Rose Family,* below). Of this family it may be considered the type. Roses grow in such a variety of soil and climate and adapt themselves so readily to cultivation that different varieties have been developed by the hundreds. Botanists disagree widely in their classifications, the estimates for number of species of roses ranging from thirty to 250. In its natural state the rose plant is an erect or climbing shrub, which bears thorns and single flowers having five petals. The flowers borne by cultivated varieties are generally double, and some forms have been produced that are thorn-

less. Floriculturists recognize two main classes of cultivated roses—those that bloom once a year, usually in early summer; and those that flower more than once in a single season. The latter are known as *perpetual,* or *summer and autumn,* roses.

The summer-flowering roses are represented by such groups as the *Provence, damask* and *French, alba, brier, evergreen, multiflora* and *pompon;* the perpetual by the *hybrid perpetual, hybrid tea, moss, Bourbon, China, musk, perpetual brier* and *Ayrshire.* The descriptions of these groups and of the scores of varieties belonging to them would fill a small volume.



SOME MEMBERS OF THE ROSE FAMILY

Florists are especially interested in the following, as they are among the most popular cut flowers for winter purchase: the white *bride,* pink *bridesmaid,* yellow *pearl of the garden,* blush *golden gate,* red *American beauty,* crimson *liberty* and cherry red *Ulrich Brunner.* For out-of-door growth there is probably no more satisfactory class than the hybrid tea roses, for they are hardy and vigorous. The Killarney roses, everywhere popular because of their beautiful pink color and delicious perfume, are among the best of this group.

How to Grow Roses. In selecting a plot for a rose garden one should choose a site protected from cold winds and open to the sun for several hours of the day. A deep, rich loam is usually the best soil for these flowers, but hybrid tea roses can be grown in sandy and gravelly soil. Whatever the soil, it must be well drained. If artificial drainage is necessary this may be secured by placing a layer of small stones or gravel about two feet below the top soil and sloping it so as to carry off the surplus water. Roses, like children, cannot be healthy if their feet are wet. A few weeks before planting, one should mix the soil, to a depth of two feet, with about one-third its bulk of rotted manure. Rose roots must not be allowed to come in contact with fresh manure, for, in the language of the gardener, it will give them indigestion.

The time for planting depends on variety of rose and on location. Though some hardy roses can be planted in autumn, the general rule is to plant in the spring. When the stems are received from the greenhouse see that the roots are protected from the drying action of the winds until they are put in the ground. If necessary, cover them with burlap or similar material, and keep them damp. The holes should be deep enough to permit the roots to point downward and to slant outward, for they must not lie flat. Care should be taken to have the plants so arranged that the beds can be easily watered and weeded. A good, general rule is to have the beds not over five feet wide, and the rose plants from eighteen inches to two feet apart each way, according to their spreading habits. An essential point in successful rose growing is to keep the surface soil loose during the growing season (well into July in case of spring planting). This may be done with a hoe and a sharp steel rake.

The Rose Family. Botanists combine all members of this family of plants under the name *Rosaceae* (pronounced *ro za'se a*). In the family are about 2,000 species of trees, shrubs and herbs, and it is represented by some of our most valuable fruits and loveliest flowers. To the rose family belong a large proportion of the commercial fruits of the temperate regions, notably the apple, pear and quince, the berries, and the peach, apricot, plum and cherry. Its numerous ornamental plants include the rose, the meadowsweet, the mountain ash and the hawthorn. Many useful products are yielded by rosaceous plants, such as oil of bitter almonds, attar of roses and several fine cabinet woods. The plants of this family bear regular flowers, each having five petals, a five-lobed calyx, numerous stamens and one or more carpels (see FLOWERS, subhead *Flower Structure*). As they are seed-bearing plants they are classed as *angiosperms*, and because they produce two seed leaves they belong to the *dicotyledonous* plants (see subhead under COTYLEDON). B.M.W.

Consult Thomas's *The Rose Book;* Sanders' *Roses and Their Cultivation;* Pemberton's *Roses: Their History, Development and Cultivation.*

Related Subjects. The reader is referred to the following articles in these volumes:

Angiosperms	Flowers
Attar	Hawthorn
Cotyledon	Mountain Ash

ROSEBERY, *rohz'ber i,* ARCHIBALD PHILIP PRIMROSE, Earl of (1847-), a distinguished English statesman who succeeded to the title in 1868 on the death of his grandfather. He was born in London, studied at Eton and at Christ Church, Oxford, and in 1868 took his seat in the House of Lords. There he speedily acquired a reputation as a forceful speaker, and by advocating measures for bettering the condition of the working classes won such popularity as usually comes to members of the Lower House rather than to those of the Upper. His first office was the Undersecretaryship for Home Affairs, which he received in 1881 and held for two years, resigning because there was considerable opposition to a member of the House of Lords holding that post. In 1884 he became first commissioner of works, with a seat in the Cabinet, and although he went out of office with the Liberals in the next year, he became Secretary of State for Foreign Affairs in the brief Ministry of William E. Gladstone in 1886. Meanwhile he had been chosen lord rector of Aberdeen University in 1878 and of Edinburgh University in 1880.

In 1889 Lord Rosebery became chairman of the first London County Council, and in 1892 was given by Gladstone the post of Foreign Secretary in the new Liberal Cabinet. In this position he avoided trouble with France over the question of Siam and urged the control by Great Britain of the Upper Nile Valley and of Uganda. When Gladstone resigned in 1894 Rosebery became Prime Minister, and the appointment gave general satisfaction, although the Ministry endured for only fifteen months. Lord Rosebery remained leader of the Liberals, however, until October, 1896, when he broke with the party on the question of intervention in Turkey, strongly recommended by Gladstone, to check Armenian atrocities (see ARMENIA). From that time he took no part in party politics, though retaining all his old interest in public affairs. During the South African War he urged the necessity of support of the government by all parties though he was far from approving the conduct of the war and saw great necessity for army reform.

Lord Rosebery is the author of various publications, including *William Pitt; Appreciations and Addresses; Sir Robert Peel; Napoleon; Cromwell,* and *Chatham: His Early Life and Connections.* He has always been keenly interested in sports, and three times won the Derby —once while he was Prime Minister.

Consult McCarthy's *British Political Portraits.*

ROSECRANS, *ro'ze kranz,* WILLIAM STARKE (1819-1898), an American soldier and brigadier-general in the Union army during the War of Secession. He was born at Kingston, O. After graduating at West Point in 1842, he served in the army as civil engineer until 1854. At the beginning of the War of Secession he volunteered as aide to General McClellan, and when the latter was appointed commander of the Army of the Potomac, Rosecrans was commissioned brigadier-general and placed in command in West Virginia. In 1862, after the evacuation of Corinth by the Confederates, he was given command of the army in Mississippi and successfully defended the city against Price and Van Dorn, but in 1863, as commander of the Army of the Cumberland, he was defeated by Bragg at Chickamauga (see CHICKAMAUGA, BATTLE OF). Shortly afterwards Rosecrans was succeeded by Thomas as chief of the Army of the Cumberland, and eventually was relieved of all authority. At the close of the war he resigned from the army, and in 1868 was appointed minister to Mexico. From 1881 to 1885 he was a member of Congress from California, and from

1885 to 1893 was register of the United States Treasury. His rank of brigadier-general was restored to him by Congress in 1889.

ROSEMARY, *rohz'ma ri,* an evergreen shrub of the mint family, loved for the aromatic fragrance of its leaves. It is a native of the Mediterranean region. Rosemary grows from four to eight feet high and bears dark green leaves with a white under surface, and tiny pale-blue flowers. When seen in masses it looks like blue-gray mist blown over the meadows from the sea. The name, in fact, is derived from the Latin *rosmarinus,* meaning *sea dew.* Rosemary yields an oil which is used chiefly in perfumes and in aromatic waters. The plant is an emblem of fidelity and remembrance. In *Hamlet* occurs the often-quoted remark of Ophelia, "There's rosemary, that's for remembrance."

The American *marsh rosemary,* common in the salt bogs of the Atlantic states, is a member of the leadwort family.

ROSES, Wars of the, the name given in English history to the struggle which took place in the latter part of the fifteenth century between the House of York and the House of Lancaster for the possession of the English throne. The House of Lancaster took as its emblem a red rose, the House of York a white rose, and from these insignia came the name given to the conflict. The wars began in 1455 with the Battle of Saint Albans and closed with the Battle of Bosworth, in 1485. At the outbreak the king was Henry VI, a grandson of the Lancastrian Henry IV, who had seized the throne in 1399; his chief opponent was Richard, Duke of York. During the struggle Henry was deposed and Edward IV of the House of York was crowned king; Henry was reinstated and a second time forced to give up the royal authority to Edward. The Yorkists held the royal power without active opposition until the accession of the unpopular Richard III, whom a rising under the Duke of Richmond, head of the Lancastrian House, drove from the throne. Richmond was crowned king as Henry VII, and by marrying Elizabeth, daughter of Edward IV, he united the two rival houses. See Lancaster, House of; York, House of.

Consult Gairdner's *The Houses of Lancaster and York.*

ROSETTA, *ro zet'a,* STONE, the stone which gave to the world the key for the translation of the long-lost ancient Egyptian language (see Hieroglyphics). It is inscribed with a decree of the Egyptian priesthood, which had assembled at Memphis in 195 B.C. The decree, issued in honor of Ptolemy V Epiphanes (205-181 B.C.), was written in hieroglyphics, or picture writing, in demotic, a simplified form of Egyptian writing, and in Greek. Scholars were able to decipher the Egyptian texts by comparing them with the Greek, and in this way they found the clue to the hidden characters of the language of the ancients. The Rosetta Stone, now in the British Museum, is composed of black basalt. It was found near Rosetta, Egypt, in 1799 by a French officer of Napoleon's engineering corps. Parts have been broken away, and at present it is three feet, nine inches in height, eleven inches in thickness, and two feet, four and one-half inches in breadth.

THE ROSETTA STONE
As seen in the British Museum, London.

Consult Budge's *A History of Egypt;* Sharpe's *Rosetta Stone in Hieroglyphics and Greek.*

ROSE WINDOW, a large, circular window divided by slender bars into compartments, used in Gothic churches. Usually a rose window is formed of beautifully-colored glass, but it is frequently of plain glass; the name is not due to color, but to its shape. When the tracery radiates from a center, or is more distinctly committed to a spoke-like arrangement, the window is often called a *Catherine wheel, marigold* or *wheel window.* The rose window was a feature in the church architecture of the thirteenth and fourteenth centuries in France and England. Many examples are found in the cathedrals of Paris, Rheims and Amiens.

ROSE WINDOW

ROSE'WOOD, the name of several varieties of a beautiful wood used in making ornamental furniture and musical instruments. Rosewood is prized for the high polish it attains, and for

its rich color, which varies from red-brown to purple or almost black. The black varieties are often beautifully streaked with red. When the wood is cut or sawed, a slight odor of roses is perceptible, which accounts for the name. The heartwood grows to great dimensions and is always faulty, as decay begins before the tree matures. For this reason, squared planks or logs are not seen; the wood is imported in slabs from ten to twenty feet long, and from five to twelve inches wide in the heaviest part. On account of its irregular form the wood is sold by weight, the price depending upon the richness of the color, and varying from $50 to $90 per ton; unusual specimens are sold for $450 per ton. Rosewood is employed solid and as veneer. It comes principally from Jamaica, Brazil, Honduras, East India and Africa; a choice quality is the product of the *Dalbergia* tree, found in Malabar, India.

ROSIN, *rahz'in,* the resin of pitch pine, which may exude from wounds in the tree, but which is obtained for commercial purposes by distilling turpentine, the rosin remaining in the tank after the turpentine has passed over. Rosin is a brownish-yellow solid resembling a gum in structure and having an odor like that of varnish. It is most extensively employed in the manufacture of varnish and is also used for hardening laundry soap, in soldering, in the manufacture of sealing wax and in making some kinds of plaster and cement. See RESINS; TURPENTINE.

ROSS, ALEXANDER (1783-1856), a Canadian pioneer, whose books about early days in the Northwest constitute a valuable part of Canadian history. The most important of these are *Adventures of the First Settlers on the Oregon or Columbia River; The Fur Hunters of the Far West,* and *The Red River Settlement,* the last being written in the year of his death. Ross had an eventful career. He was born in Scotland, but emigrated to Canada when he was eighteen. He taught school for some time in Glengarry, Upper Canada, went to Oregon with John Jacob Astor's expedition in 1810, and then for more than a decade was in the employ of the Hudson's Bay Company. About 1825 he settled in the Red River district, where he had a large share in developing the section.

ROSS, BETSY (1752-1836), an obscure seamstress of Philadelphia who gained an honored place in the history of the United States as the maker of its first national flag. She was living in a small, old-fashioned brick house, at 239 Arch Street, when, in June, 1777, she was visited by a committee from Congress, headed by General Washington; the committee had heard that she was an expert needlewoman, and it desired her to make a flag according to the design adopted by Congress on June 14 (see FLAG, subtitle *United States Flag*). The story has come down that Washington preferred six-pointed stars, and that she persuaded him to allow her to make five-pointed ones. The flag made by her (shown on page 2195) had thirteen white stars arranged in a circle on a blue field, and thirteen alternate red and white stripes. Her work was so satisfactory that the government made a contract with her to provide all of its flags, and the business was continued by a daughter for over twenty years after the death of Mrs. Ross. The old house on Arch Street (pictured on 4622) has been made a permanent memorial by the Betsy Ross Memorial Association.

> "The simple stone of Betsy Ross
> Is covered now with mold and moss,
> But still her deathless banner flies,
> And keeps the color of the skies.
> A nation thrills, a nation bleeds,
> A nation follows where it leads."

Betsy Ross was the daughter of Samuel Griscom, a Quaker shipbuilder and carpenter who helped build Independence Hall. Her husband, John Ross, was the nephew of one of the signers of the Declaration of Independence.

ROSS, SIR GEORGE WILLIAM (1841-1914), a Canadian educator and statesman, for many years a teacher and public school inspector, later in turn a member of the Dominion House of Commons, minister of education for Ontario for sixteen years and premier of that province. As minister of education he secured the passage of the law federating the University of Toronto, and as premier he was instrumental in securing the construction of the Timiskaming & Northern Ontario Railway, which opened to settlement a rich, new region. Sir George was a man of more varied gifts and activities than perhaps any other Parliamentary leader of his time.

Sir George was born near Nairn, Ont. He attended the Toronto Normal School, and for many years was a teacher in the public schools. From 1872 to 1883 he sat as a Liberal in the House of Commons. He was then Ontario minister of education until 1899, and premier of the province for six years more. In middle life, after he was already a national figure, he studied law, and was called to the bar in 1887. In 1907 he was called to the Dominion Senate, in which he became the Liberal leader. Espe-

cially in his later years Sir George won a wide reputation as a lecturer, particularly in favor of temperance reform and prohibition. He also found time to write several books, including the *Life and Times of Alexander Mackenzie; The Universities of Canada; The School System of Ontario; The Senate of Canada,* and a volume of reminiscences, *Getting into Parliament and After.*

ROSS, SIR JAMES CLARK (1800-1862), an English explorer, born in London. In 1818, and again in 1829-1833, he accompanied his uncle, Sir John Ross, on expeditions in search of the Northwest Passage, and on the second of these excursions distinguished himself by discovering the location of the north magnetic pole. In the interval between these two voyages with his uncle he made four Arctic expeditions under Parry. His most noteworthy service to science, however, was his expedition, in 1839, with the *Erebus* and *Terror,* to the Antarctic seas. He discovered a great body of land which he named Victoria Land, several islands, and an active volcano which he called Erebus. The latitude reached by him, 78° 10′ S., established a record which was not broken until 1900. On his return Ross was knighted. In 1848 he headed an unsuccessful expedition in search of Sir John Franklin, and in 1856 became a rear-admiral. An account of his Antarctic journey is contained in *A Narrative of a Voyage in Antarctic Regions.*

For comparison of his voyages in Antarctic regions with others which followed, see AMUNDSEN, ROALD; SCOTT, ROBERT F.; SHACKLETON, ERNEST. See, also, POLAR EXPLORATION.

ROSSETTI, *ro set′i,* CHRISTINA GEORGINA (1830-1894), an English poet, the sister of Dante Gabriel Rossetti (see below). She was born in London, educated in her home with her brothers and sisters, and lived a quiet, retiring life. Her interests were two—religion and poetry; and naturally all her writings show clearly her religious, mystic tendency. They are, however, almost as noteworthy for the delight which they reveal in the simple physical beauty of the world. Critics agree in ranking Christina Rossetti next to Mrs. Browning among English women writers of the nineteenth century, and some of her short lyrics stand among the best things ever produced in English. *Goblin Market and Other Poems, The Prince's Progress and Other Poems* and *A Pageant and Other Poems* contain the most of her work. *Up Hill* is probably the best known and best loved of her poems.

ROSSETTI, DANTE GABRIEL (1828-1882), an English poet and painter, one of the prominent leaders in a movement to bring back to painting the purity and simplicity which had characterized it in the Middle Ages. He and his companions in this movement organized the Pre-Raphaelite Brotherhood in 1848, and founded a periodical called *The Germ* for the exposition of their views (see PRE-RAPHAELITES). In this paper was published one of Rossetti's earliest and loveliest poems, *The Blessed Damozel,* whose opening lines suggest the idealism and spirituality of all the Pre-Raphaelite art and literature:

> The blessed damozel leaned out
> From the gold bar of Heaven;
> Her eyes were deeper than the depth
> Of waters stilled at even;
> She had three lilies in her hand,
> And the stars in her hair were seven.

Rossetti was the eldest son of an Italian painter and writer who was exiled for taking part in the revolution of 1820. Dante Gabriel was born in London, where his father settled in 1824. The boy grew up under literary and artistic influences, and was well educated, studying at King's College School and at the Royal Academy of Art. The influence of Ford Madox Brown, who became his art teacher when Rossetti was twenty, was also far-reaching. Rossetti was married in 1860 to a beautiful girl who furnished the inspiration for the best of his paintings and of his poetry, and when she died, two years after their marriage, his grief was so intense that he placed in her coffin all of his writings then unpublished. In 1870, yielding to the demands of his friends, he permitted them to be exhumed and published. This collection, a volume of *Ballads and Sonnets* (1881) and a series of translations of early Italian poets (1874) constitute his entire poetical output. Of his sonnets, the most notable are found in a series entitled *The House of Life,* a collection of beautiful love poems of which his wife was the inspiration. He also wrote *Hand and Soul,* a delicately imaginative story in prose.

Rossetti's paintings are remarkable chiefly for their spiritual quality and mysticism. He found his themes in Biblical subjects, in the life and work of Dante, and in his own imagination. These themes are represented by *Girlhood of Mary Virgin; Dante's Dream* and *Beata Beatrix;* and *The Blessed Damozel* and *Fiammetta.* Just as his paintings express the idealism that characterizes his poetry, so his

poems have a beauty of language that is best described as word painting. In both forms of his art he expressed unreservedly his individuality.

Consult Cary's *The Rossettis;* essays by Walter Pater in *Ward's English Poets.*

ROSSINI, *roh se'ne,* GIOACHINO ANTONIO (1792-1868), an Italian composer, was born at Pesaro. His mother was the daughter of the town baker and his father was the town trumpeter, who played with strolling musicians in summer and thus made enough money to keep the family during the winter. At the age of ten Rossini played a horn with these rough wanderers, and the lawless life he led showed its impression later in his personal conduct as well as in his operas. When he was twelve years old he went to Bologna to study music, and two years later could sing at sight any composition placed before him. He was compelled by his teachers to study counterpoint, a subject which he detested, and as soon as he had learned enough of it to compose operas he refused further musical training and ended his days as a student. In after years his operas revealed his ignorance of many points in composition, but as he was a man of much vanity he never seemed to realize his weaknesses.

When he was eighteen years old he wrote his first opera, *Demetrio,* but it was in his twentieth year that he began to show marvelous inventive powers. In that one year of 1812 he composed five operas, one of which was *Tancredi,* a story of the Crusades, which was a remarkable success. In 1816 and 1817 Rossini had a contract to write two operas each year for a theater at Milan, and during that period produced such highly popular compositions as *The Barber of Seville* and *Otello.* During the next five years he wrote with great rapidity such operas as *Moses in Egypt, Ermione* and *The Lady of the Lake,* the latter based on Scott's famous poem. These successful works all appeared before Rossini's thirtieth birthday. In 1822 he married a very wealthy woman, and soon went to Vienna to direct the production of his *Zelmira.* Beethoven, then living in Vienna, was, for the time being, practically forgotten in the enthusiasm for the new composer.

Rossini's popularity, however, began suddenly to wane. His indolence prevented him from inventing new themes; he was constantly patching together bits of old airs to make new ones; his unrestrained habits shocked many people; his vanity and praise of himself disgusted others. Having squandered his wife's fortune, he plunged into debt, and then took the pains to write a really excellent opera, *Semiramide.* But the Italian people received it coldly, and Rossini, in disgust, went to England. There his operas were a failure, but he used his fame so shrewdly in giving lessons that he cleared $50,000 in five months. He then proceeded to Paris, where by skilful advertising he had himself appointed director of the Italian opera and procured from the government an annual pension of $4,000. He became too indolent to write anything new and again patched parts of his former works together until the Italian Opera House was ruined financially. An attempt to stop his pension caused him to bring suit against the government to retain it, and during the six years of the trial he lived in a garret reached only by a frail ladder. This was to make the public believe him in poverty; but it deceived nobody, for it was well known that he owned at Bologna a palace in which the silverware alone was valued at $100,000. He won his suit and in 1836 returned to Italy, where, rich but miserable, he spent his last days. R.D.M.

Consult Bevan's *Rossini;* Edwards' *The Life of Rossini.*

ROSS'LAND, a mining community in the West Kootenay district, British Columbia. It is six miles north of the United States boundary and fifty-five miles by rail southwest of Nelson, B. C. It is served by branches of the Canadian Pacific and Great Northern railways. Rossland is the center of the gold-copper mining district, and when this section was first opened it grew rapidly. The city was incorporated in 1897, and in 1901 had a population of over 6,000. After the boom was over the population slowly declined, but the mines are still producing and the city is still prosperous. Population in 1911, 2,826; in 1916, about 3,500.

ROSTAND, *rohs tahN',* EDMOND (1869-), a French writer of plays and poetry, and the son of a prominent journalist, was born in Marseilles. Rostand's first play, a comedy in verse, was produced in Paris in 1894, and was immensely successful. Both this and his later plays proved him a skilful dramatist, a satirist and a poet. Three other plays followed in quick succession, and then came his greatest success, *Cyrano de Bergerac,* a "heroic comedy" in verse, which was produced by the famous French comedian, Coquelin, who also played the leading part. The play was quickly translated into English, German, Russian and other

European languages, and was produced in several continental cities.

In 1900 *Cyrano* and *L'Aiglon,* another of Rostand's plays, were presented in America by Sarah Bernhardt and Coquelin. Richard Mansfield produced *Cyrano* in English in the United States and Canada. A Chicago business man named Gross filed suit against Rostand, claiming that Rostand's play was a plagiarism of his own comedy, *The Merchant Prince of Cornville.* Gross won the suit, and *Cyrano de Bergerac* had to be withdrawn. Rostand has written several other plays. His most conspicuous success after *Cyrano* was *Chantecler,* a fantasy of bird and animal life which was awaited with great interest and hailed with enthusiasm both in France and in America, where Maude Adams appeared as "Chantecler." Rostand was elected to the French Academy in 1902.

ROS'THERN, a town in the central part of Saskatchewan, and on the Canadian Northern Railway about midway between Prince Albert and Saskatoon. It is forty miles north of Saskatoon and forty-seven miles south of Prince Albert. Rosthern is situated in one of the richest wheat-growing areas in the world, a district made famous by Seager Wheeler, the world's champion wheat grower, who lives four miles from the town. Rosthern's five elevators are among the largest west of Winnipeg. Flour milling is the only important industry. Rosthern was settled in 1896, and was incorporated in 1906. The attractive town hall, built at a cost of $30,000, was completed in 1909. Nearly half of the residents of Rosthern are of German birth or descent. Population in 1911, 1,172; in 1916, about 1,400.

ROSTOCK, *rohs'tohk,* one of the busiest German ports on the Baltic, and the largest town of Mecklenburg-Schwerin, is situated on the Warnow River, about eight miles from the sea. No other Baltic port possesses so large a merchant fleet. Although the city has a medieval appearance, its busy fairs for the exchange of wool, horses and cattle are thoroughly modern in spirit. The industries are varied, the most important being shipbuilding, the making of machinery and chemicals, brewing and distilling. Rostock is the seat of the supreme court of both the duchies of Mecklenburg, and is well supplied with schools, hospitals and other institutions. Among the most interesting of its buildings are Saint Mary's, one of the finest Gothic churches of Northern Germany, the ducal palace, the Gothic town hall, with its many turrets, and the new university building. A statue of Blücher, who was born here, adorns one of the city's many fine squares. The university was founded in 1418 and rebuilt in 1867. It has a library of 140,000 volumes, an observatory, and an experimental agricultural colony. Population of the city in 1910, 65,377.

ROSWELL, *rahz'wel,* N. M., the center of one of the largest cattle and sheep-raising sections of the United States, and the county seat of Chaves County, is situated in the southeastern section of the state and on the Pecos River. Amarillo, Tex., is 212 miles northeast by rail, and El Paso is 230 miles directly southwest. Transportation is provided by the Atchison, Topeka & Santa Fe Railroad, constructed to this point in 1900. The most important industry of the place is the raising of cattle, sheep, alfalfa and apples. The county courthouse, constructed at a cost of $161,000, the $115,000 Federal building, the New Mexico Military Institute, Saint Mary's Hospital, the Carnegie Library and a high school are features of interest in the city. Although the place was settled in 1877, it did not become a city until 1903. In 1910 the population was 6,172, about five per cent of the inhabitants being Mexicans and negroes.

ROTATION, *ro ta'shun,* **OF CROPS.** Agriculturists have found that raising the same crop on a field, year after year, deprives the soil of its fertility, no matter how deep and rich the soil may be. An experiment conducted by the Illinois Agricultural Experiment Station affords a striking illustration of this fact. A record of the crops grown during a period of twenty years shows the following results: One plot was kept in corn for the entire period; on another, corn and oats were grown in rotation; on the third, clover was added to corn and oats. On the first plot, the yield at the end of the period was twenty-nine bushels to the acre; on the second, forty-eight bushels, and on the third, eighty bushels. At the experiment station of Tennessee it was shown that, under a proper system of farming, the productivity of the soil was increased from twenty to eighty bushels an acre.

All fertile soil contains available plant foods —nitrogen, potash and phosphorus—in varying proportions, and also a sufficient amount of water to dissolve these foods and supply them to the plants as fast as they are needed. One plant requires a larger proportion of some of these foods than another, and if that plant is

grown upon the land year after year the supply of this food becomes exhausted to such a degree that the plant is not sufficiently nourished to produce a good yield. Again, all plants drain the soil of its nitrogen, and unless means for restoring nitrogen are employed the soil soon becomes infertile. The best method of restoring nitrogen is to plant clover, cowpea, soy bean or some other leguminous plant, and to plow the crop under. This is called *green manuring*. By a diversified system of farming different crops follow each other in a regular order, and no one element of plant food is drawn on more extensively than another. The fertility of the soil is maintained and the farmer receives greater returns for his labor.

Another reason for the rotation of crops is that the continuous growing of one sort of grain or other crop contributes to the growth of weeds, insect pests and plant diseases. Small grains should be followed by tillage crops, such as corn or potatoes, so that weeds may be killed. If the field becomes infested with the Hessian fly, for instance, raising corn, then potatoes and then clover will rid the field of the pest. A third reason for rotation of crops is that a variety of crops assures the farmer of a better income for a period of years. No system of rotation will apply to all localities, but the following is suggestive:

First and second years, corn, planted on ground enriched by a green manure crop previous to the planting of the first crop.

Third year, a small grain. In the wheat belt two successive crops of wheat might take the place of the two crops of corn.

Fourth year, timothy and clover. At the end of this year the sod may be turned over and the system of rotation begun again. Some farmers, however, prefer to keep the field in timothy and clover for two or more seasons. See FERTILIZER; SOIL. W.F.R.

Consult Parker's *Field Management and Crop Rotation.*

ROTH'AMSTED, the oldest and most purely scientific agricultural experiment station in the world, was established in 1843 by Sir John Bennett Lawes, Bart., F.R.S., on his ancestral estate adjoining the village of Harpenden in Hertfordshire, England. Since 1889 it has been in the hands of a trust created by its founder, with an original endowment of nearly half a million dollars for its maintenance on the original plan. It is divided into "fields," of which Broadbalk (sown continuously to wheat, without fertilization), Agdell (with rotation of crops) and Hoos (since 1848 devoted to roots of leguminous plants) are among the most famous. The park grass plots began in 1856. Careful records are kept, and samples of each year's harvest are preserved. The work is not commercialized in any way, but is wholly scientific; and while the annual report is awaited with interest by agriculturists and others throughout the world, there are no issues of bulletins of advice to farmers. A. D. Hall, F.R.S., in charge of the institution, said, in 1912:

It is impossible to exaggerate the importance of continuing the experimental plots at Rothamsted without any change, as nowhere else in the world do such data exist for studying the effects of season and manuring upon the yield and quality of the crop, and for watching the progressive changes which are going on in the soil.

ROTHS'CHILD (in German, *roht'shilt*), a famous family of European bankers, financiers and philanthropists. The name was first connected with great financial deals when Mayer Anselm Rothschild, the son of a Jewish merchant of Frankfort-on-the-Main, opened a money-exchange house in that city, and in 1806 won favor throughout Germany and Austria by caring for the fortune of the Elector of Hesse-Cassel, who had fled from the invading French. Immense sums of the wealth of royalty were henceforward intrusted to him, and before his death in 1812 he and his five sons had amassed huge fortunes. So conspicuous was the service of these sons that the Emperor of Austria made each a baron in 1822.

BARON LIONEL ROTHSCHILD

The business at Frankfort passed to the eldest son, Mayer Anselm, and then to the sons of Karl, but upon the death of the youngest of these sons the Frankfort house was closed. Solomon, the second son of the founder of the firm, established the famous house at Vienna, which repeatedly has come to the financial rescue of European nations. His brother Nathan established the British firm at Manchester in 1798, and removed it to London in 1803. Jacob, the fourth son, was founder of the famous Paris house, and Karl, the youngest, of the one at Naples. The enterprises are yet conducted by descendants of the founders.

The power of these establishments has been stupendous. They have financed wars and have frequently prevented wars by refusing loans; they have aided in the establishment of national educational systems, such as those of Germany and France; their assistance in European industrial development can scarcely be estimated. Lionel Rothschild, son of Nathan of London, was the main influence leading to Jewish emancipation in Great Britain. Elected five times to Parliament, he refused each time in taking the oath to repeat the words, "on the true faith of a Christian," and this aroused such a discussion that in 1858 the rule requiring the phrase was abolished.

Consult Balla's *Romance of the Rothschilds;* Reeve's *The Rothschilds.*

ROTTEN BOROUGHS, *rot''n bur'ohz,* the name applied to certain electoral districts represented in the British Parliament before the passage of the Reform Bill of 1832. These were but sparsely populated or had no populations at all. For several centuries the parliamentary districts had not been rearranged. In the meantime the population had shifted, great industrial towns had arisen and older towns had decayed. Manchester and Birmingham, each with over 100,000 citizens, had no voice in the national government, while in some districts the landowners were able to go to Parliament without even the formality of an election. It required nearly a century of agitation to abolish the rotten boroughs.

ROTTERDAM, *rot'er dam,* the chief commercial port of Holland and, next to The Hague, its largest city, is situated on both sides of the River Meuse, nineteen miles from its mouth and sixteen miles southeast of The Hague. In addition to having an extensive ocean traffic with countries over the seas, Rotterdam is an important port for vessels bound to and from the Rhine provinces of Prussia, for the Meuse is the great highway from the open sea to the Rhine and the interior of Europe. New canals, wharves, quays and docks have been built, and every possible improvement has been made to render the waterway service excellent. Large ships are now able to reach the sea two hours after leaving Rotterdam.

The city is divided into two parts by High Street. The old quarter is a collection of quaint, wooden buildings, while the newer section contains wide, well-kept streets, lined with substantial buildings constructed for service rather than great beauty. The Saint Lawrence Church, built in the fifteenth century, has a large organ and many marble monuments in honor of the city's distinguished men; Erasmus, the scholar, who was born here, is honored by a fine bronze statue on the open market place, and his home is a feature of great interest. The Boyman's Museum contains a notable collection of paintings by Dutch masters. Other buildings of prominence are the exchange, the town hall, the courthouse and the post office. The zoological and botanical garden and a beautiful park are also features of the city. Some of the largest docks are on the south side of the river, where also are located the busy ironworks and shipbuilding yards. In addition to their shipping activities, the thrifty people of Rotterdam carry on an extensive trade in butter, cheese, linen and flax, and in articles of gold and silver. Population in 1914, estimated, 459,357.

ROUBAIX, *roo beh',* a manufacturing town and trading center in the north of France, situated in the department of Nord, about eight miles northeast of Lille. In 1914, during the invasion of the Germans, Roubaix, with many other towns and villages, was captured and placed under martial law (see WAR OF THE NATIONS). Almost all of its people and those in the immediate vicinity were employed in the various factories, where cloth for men's garments, shawls, stuffs for furniture and ladies' dresses, velvet, wool, cotton and silk—products having an annual value of $80,000,000—were made. The National School of Industrial Arts is located here. Population in 1911, 122,723.

ROUEN, *roo ahN',* a leading manufacturing city of France, and capital of the department of Seine-Inférieure, situated on the Seine River, eighty-seven miles northwest of Paris. Although its old ramparts have been converted into broad boulevards, and the newer quarters are regularly built and contain fine modern dwellings, Rouen still retains much of its medieval atmosphere in its crooked but picturesque streets and many old houses with their quaint gables and carved timbers. The old Cathedral of Notre Dame is a noble piece of ancient Gothic architecture; the Church of Saint Ouen, which surpasses the cathedral both in size and beauty, is one of the finest of the city's medieval structures. Other places of interest are the Church of Saint Patricia, with its gorgeous colored windows; the Tower of Joan of Arc, where this soldier-heroine was imprisoned; the palace of justice, where the assizes are still held, and the Hotel de Ville, containing the public library.

Rouen's commercial importance is due chiefly to its extensive manufacture of checked and striped cottons. Hosiery, mixed silk and woolen goods, shot, chemicals and refined petroleum are other products of manufacture. The history of Rouen has been eventful since the days of the Northmen, who made it their capital (see NORMANDY; NORMANS). In 1204 it was taken by siege by the French king, Philip Augustus, and annexed to France. During the wars of Henry V and Henry VI of England the city was under English control from 1419 to 1449; in the latter year it was retaken by the French under Charles VII. In 1431 Joan of Arc was burned at the stake in a public square, which now contains a statue of the heroine. Population in 1911, 124,987.

ROUGE, *roozh,* the French word for *red,* is the general name for cosmetics used to color the skin. Safflower, citric acid and French chalk enter largely into the manufacture of a rouge in general favor. Authorities agree that the ultimate effects of the use of coloring matters are harmful, as they clog the pores of the skin and the drugs contained in the preparations are absorbed by the system. A preparation made from crystals of sulphate of iron, called rouge, is used by jewelers for polishing purposes.

ROUGE-ET-NOIR, *roo zha nwahr',* the French for *red and black,* is the name of a game of chance much in vogue in Europe, especially in the gambling rooms of Monte Carlo. It is played with the cards of six complete decks. The players arrange themselves about a green-covered table, on which is a diagram showing four divisions upon which money may be placed as a bet. These are *rouge, noir, couleur* and *inverse.* The banker, or dealer, deals a row of cards (face up) for noir until the spots number between 30 and 40, face cards counting 10 and aces 1. Then a similar row is dealt for rouge. The row which most nearly approaches the number 31 is the winning one, and the players who have staked on the winning color get double stakes. If the first card turned up in the deal is of the winning color couleur wins, and if the contrary is true inverse wins. A fresh deal is made when the number of spots is the same in each row; that is, in case of a *refait,* or tie. If both count exactly 31 the banker claims one-half of all stakes, a rule which gives him an advantage calculated to be equal to about 1.25 per cent on all sums staked. Each player shuffles a part of the cards before the game starts, and the banker then shuffles them all. The game is also called **trente-et-quarante** (thirty and forty).

Consult Foster's *Complete Hoyle.*

ROUGH RIDERS, the name popularly given to the First Regiment of the United States Volunteer Cavalry, which, during the Spanish-American War, served in Cuba under Leonard Wood and Theodore Roosevelt. Before that time the name had been familiar in connection with Buffalo Bill's "Wild West Show and Congress of the Rough Riders of the World," and was applied to the volunteer cavalry regiment because that body was made up largely of cowboys and Western hunters. Roosevelt, promoted to the rank of colonel, led his Rough Riders in the charge up San Juan Hill on July 1, 1898. When the regiment was mustered out its members formed the patriotic society known as the Rough Riders' Association, which has as its object the perpetuation of memories of the war. It has also an insurance fund for the relief of needy members. All members of the regiment are eligible, and the right to belong descends to the oldest son. See ROOSEVELT, THEODORE.

ROULETTE, *roo let',* a gambling game of French origin, played first in the famous gaming rooms of Monte Carlo, and from there spread throughout the world. It is not in any way a game of skill, and though "systems" to beat the game have been invented and tried in great numbers, none has evolved any reliable or successful plan. It is purely a game of chance, with any possible advantage on the side of the bank.

The roulette table is covered with green cloth, with a wheel in the center. The cloth is divided into spaces marked *passe, pair, manque, impair* and two diamond-shaped spaces colored black and red. The wheel is divided into 37 compartments, numbered from 1 to 36 and one with 0. *Pair* indicates even numbers; *impair* odd numbers; *manque* indicates the numbers from 1 to 18 inclusive; *passe,* the numbers from 19 to 36.

As played at Monte Carlo the minimum stake is five francs, but elsewhere stakes can be arranged to suit the players. There are innumerable ways of staking: on color, odd or even numbers, on single numbers, on groups, and many others. At Monte Carlo the *croupier,* whose duty it is to set the wheel revolving and literally rake in the money lost to the bank, calls out "Faites votre jeu," meaning *play,* starts the wheel revolving and throws in

the marble. Stakes are then placed. When the wheel begins to stop and it is seen that the marble or ball will soon fall into a number he calls "Rien ne va plus," after which no more stakes can be placed. The croupier announces the number, the color, whether odd or even or manque or passe, and pays the winners, and with his miniature rake gathers in the money lost by bettors. Then the game begins over again, with the cry, "Faites votre jeu."

ROUMANIA, *ru ma'ni a,* the former spelling of the word RUMANIA (which see).

ROUND'ERS, an old English game now little played, from which modern baseball was derived. It can be played by two sides, or teams, of any number of players. A bat and a ball are used, but the bat is smaller than the baseball bat, and the ball is soft, in order not to injure players at whom it is thrown. An ordinary tennis ball may be used. The rules are not very definite, and there is no science in the game. The bases or goals are four, similarly placed to those in baseball, but not so far apart; the distance is optional, and depends on the players. The fielders take their places apparently without much arrangement or thought, and the batsman stands ready to hit the ball, which is thrown gently to him; he endeavors to hit it so far that he may make a *round,* or home run, from which fact the game derives its name.

A batter is out if he misses the ball three times; if, while running, the ball thrown by an opposing player hits him; if when he hits the ball a fielder catches it on the first bounce from the ground. If the ball is caught by a player, on the fly, it is an inning, or "all out," and the other side earns the right to bat.

ROUND'HEADS, the name which was first applied in derision to the members of the Cromwell faction, or Parliamentary party, in England at the outbreak of the Civil War in 1642, because they insisted on having their hair cut close to their heads. Their opponents, the Cavaliers, or Royalists, followers of King Charles I, wore long, flowing curls. The Roundheads developed into the great political parties later known as Whigs and Liberals, as opposed to the Cavaliers, Tories and Conservatives. See COMMONWEALTH OF ENGLAND.

ROUND TABLE, in the legends of King Arthur, a famous table made by the wizard Merlin, about which the knights of Arthur took their seats, and from which they were named. One seat, the Siege Perilous, was reserved for the man who should be worthy to seek and find the Holy Grail, and was finally awarded to Galahad. The Knights of the Round Table had a large part in the literature of medieval chivalry, and many modern writers have made them the subjects of prose and of verse tales. Of these the most famous are Tennyson's *Idylls of the King.* In the *Idylls* is told the story of the Round Table from the days of its founding, when—

KING ARTHUR'S ROUND TABLE

Preserved in the castle at Winchester, England. This is the table at which sat—

"that fair Order of the Table Round,
A glorious company, the flower of men,
To serve as models for the mighty world,
And be the fair beginning of a time."

Arthur had it made round that it might have neither head nor foot, and that he might sit among his knights a man among equals. The painting, in soft rose and green shades, from which the above drawing was made, was painted in the days of one of the early kings of England.

> Arthur and his knighthood for a space
> Were all one will,

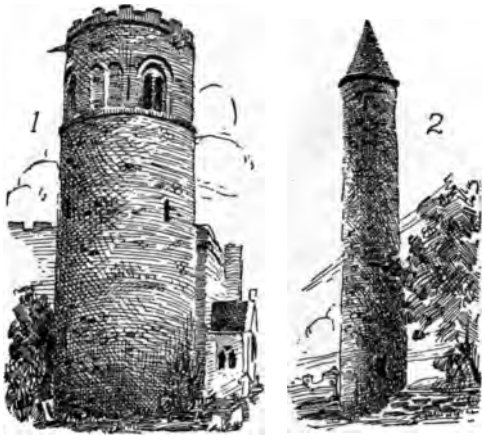
to those unhappy days when Bedivere, "first made and latest left of all the knights," cried out that—

> Now the whole Round Table is dissolved,
> Which was an image of the mighty world.

Consult Brooks' *Story of King Arthur and the Knights of the Round Table;* Frost's *Knights of the Round Table.*

ROUND TOWERS, an interesting form of medieval Christian architecture. These towers are tall stone structures, tapering from a circular base to a cone-shaped roof. They are divided into stories with wooden or stone floors, and ladders serve as staircases. In most cases there is one small window for each story and four windows just below the roof. Ireland has

a number of these towers, and a few are to be found in Scotland and other European countries. It is supposed that they were used as places of refuge in times of danger, and they may have served as bell towers.



ROUND TOWERS
(1) Round church tower at Little Saxham, Scotland; (2) round tower on Devenish Island, Ireland.

ROUSSEAU, *roo so',* JEAN JACQUES (1712-1778), the man of whom Napoleon said, "Without him the French Revolution would not have occurred." It was the special work of Rousseau to preach democratic ideals and the equality of man, and the great upheaval in French social conditions little more than a decade after his death was in part the result of the spread of these doctrines. Rousseau was born of Huguenot parents in Geneva, Switzerland. His mother died when he was so young that he retained no recollection of her, and his education was fragmentary and of little value. When a mere lad he was apprenticed to an engraver, but at the age of sixteen he ran away and went to the Duchy of Savoy, where he made the acquaintance of Madame de Warens, a lady of culture, wealth and refinement. For the next ten years Rousseau spent most of his time in the home of Madame de Warens, where he came in contact with some of the most brilliant intellects of Europe.

JEAN JACQUES ROUSSEAU
The son of a watchmaker who became one of the most powerful factors in history.

In 1741 Rousseau went to Paris, where his introduction of a new method of writing music before the Royal Academy of Sciences gained him admission to the houses of the most intellectual families of the city. He became secretary to the French minister at Venice, but the condescending attitude of his employer so wrought upon Rousseau's sensitive nature that he gave up his position and returned to Paris, where he attempted to bring suit against the minister. He soon learned, however, that a common man could not obtain redress from the aristocracy.

This was the turning point in Rousseau's career. He now began to give attention to the philosophy of government and to social conditions, and during the next fifteen years he produced a series of works which revolutionized the thought of Europe. They included *Discourse on Inequality; Julie, or the New Heloise; The Social Contract,* and *Emile,* the last an epoch-making work on education.

Rousseau was a man of marked contrasts, a character "in whom probably beyond all others, is to be found the greatest mixture of strength and weakness, of truth and falsity, of that which is attractive and that which is detestable." He possessed the highest ideals and a remarkable power of embodying them in action. In an age boastful of its intellectual brilliancy and dominated by artificial life he sounded the call "Back to Nature" with such force that his cry was heard and heeded. *Emile* was one of the great books in the field of education, and many of the principles set forth in it were adopted by Pestalozzi and Froebel. The story of Rousseau's life is told in his *Confessions,* a remarkable work in twelve volumes. E.D.F.

Consult Boyd's *Educational Theory of Jean Jacques Rousseau;* Davidson's *Rousseau and Education According to Nature.*

ROWELL, *rou'el,* NEWTON WESLEY (1867-), a Canadian barrister and statesman, long one of the leaders of the legal profession in Ontario, and since the chief of the Liberal party in the province. Rowell was born in Middlesex County, Ontario. After studying law he was called to the bar in 1891, and for twenty years practiced with increasing success. His eminence at the bar, added to his ability as a speaker, brought him into political affairs, and in 1911 he was asked to lead the Ontario Liberals, who were in need of a strong

personality to offset the effect of Sir James Whitney's efficient administration of the government. Under Rowell's vigorous direction the Liberal party acquired new strength. In the provincial elections of 1914 the Liberals made a determined but unsuccessful effort to abolish barrooms in Ontario. During the progress of the War of the Nations Rowell lent valuable aid to the government by many public addresses and by a patriotic policy in the Ontario assembly. In 1917, on the resignation of the Hearst ministry, Rowell was called to the premiership of the province.

ROWING, *ro'ing,* the act of driving a boat forward along the surface of water by means of oars. Boats so propelled, with a rudder for steering, were used earlier than 3,000 years before Christ. The ancient Greeks and Romans traveled in great galleys with rows of oars one above the other, manned by slaves who were chained to their places. In Britain the Saxons were famous oarsmen, and so were the invading Danes and Norwegians. It is recorded that Edward the Peaceable, one of the kings of England during the tenth century, "was rowed in state on the River Dee by eight tributary kings, himself acting as coxswain."

In 1715, modern boat racing had its beginning. An English comedian, Thomas Doggett, instituted a contest which is still an annual affair, by offering a prize of a waterman's coat with a great silver badge on the sleeve to the winner of the race. Amateur rowing as it is known to-day began on the Thames River, in England, about the year 1800, with informal races between six- and eight-oared boats, whose owners constituted a club. Two of these clubs, the *Star* and the *Arrow,* combined in 1818 to form the *Leander,* which is still the most famous rowing club in the world. The first race between Oxford and Cambridge universities took place in 1829, and ever since 1856 this race has been an annual event. England's most important amateur regatta is held every year at Henley, on the Thames.

Australia holds an annual regatta which is called the Australian Henley, and all of the European nations have amateur rowing associations similar to those of England. Canadian rowing has made great progress. In 1904, a Canadian, rowing alone, won the *Diamond Sculls* at Henley. Harvard and Yale universities have led in this sport in the United States since 1843-1844, when they first took it up, but the first amateur club was founded ten years earlier. The chief regatta is held on different courses in different years by the National Association of Amateur Oarsmen, founded in 1873. American rowing crews have competed bravely with the English both in the United States and abroad, but the English have almost always won.

The light boats used in racing are called *shells.* They are built for two, four, six and eight oarsmen and are known as *pairs, fours, sixes* and *eights.* In England the single rower, using two oars, is called a *sculler,* and the oars are called *sculls. Double scullers* are common in the United States but not in England. English shells and many of those constructed in the United States are built with sliding seats. The sliding seat is undoubtedly more exhausting than the fixed seat, but it may account for the Englishmen's supremacy in this sport. See CANOE AND CANOEING. A.C.

Consult Crowther and Ruhl's *Rowing and Track Athletics;* Woodgate's *Rowing.*

ROYAL GORGE, *gawrj,* one of the most famous canyons in North America, a portion

A VIEW OF THE ROYAL GORGE

of the valley of the Arkansas River. Like the Grand Canyon of the Colorado, the Royal Gorge is a magnificent example of river erosion (see EROSION). It is between eight and nine

miles long and is located in Fremont County in Central Colorado. The steep sides of the canyon rise on either side to a height of 3,000 feet, and in the bed the river flows tumultuously over rapids. One of the most remarkable features of the gorge is the wonderful variety of rock colors.

ROYAL INSTITUTION OF GREAT BRITAIN, an organization founded in London by Count Rumford in 1799, "for the promotion, diffusion and extension of science and useful knowledge." The original plan was to spread information on physics and mechanics among the laboring classes by means of public lectures, but the lecturers secured for this purpose gave the organization such fame that all classes of students were attracted and large laboratories had to be erected. Such men as Faraday, Tyndall and Gladstone were among its instructors, and many of the most valuable discoveries in physics and chemistry, especially in light and heat, were made in its laboratories. The work has always been done in the most simple and popular manner possible, and the lectures are always extremely practical and up-to-date.

There is a splendid library of about 70,000 volumes on scientific subjects, while the equipment for physical and chemical experiments is one of the most valuable in Great Britain. The Institution has received numerous bequests and is thus able to assist young scientists in their researches. All members of the society are elected by ballot; they maintain the school and experiments by means of an admission fee and annual subscription.

ROYAL NORTHWEST MOUNTED POLICE, popularly known throughout Canada as the "mounties," is the police force of the Northwest. The jurisdiction of the mounted police covers all of the territory which has ever been a part of the North West Territories, including the provinces of Alberta, Saskatchewan and Manitoba.

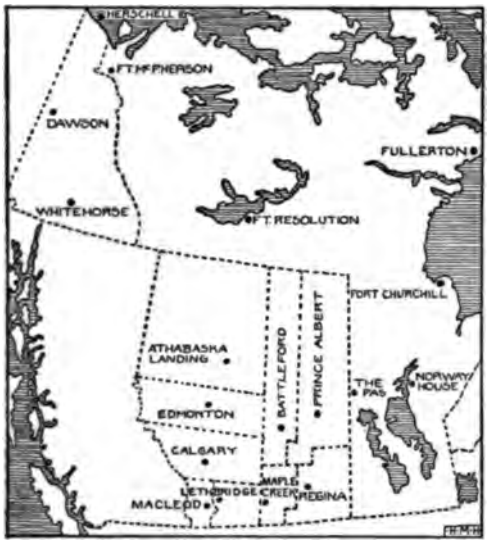
Its Beginnings. After the Dominion government in 1870 acquired formal control of the Canadian Northwest, it faced the new problem of governing a territory extending approximately 900 miles from east to west, and somewhat more from north to south. The Red River Rebellion and minor disturbances in the Northwest showed the need of some control over the section if it was ever to be open to permanent settlers. To Sir John A. Macdonald belongs much of the credit for the idea of a mounted police force and for its successful adoption, although the force was actually organized during Alexander Mackenzie's Ministry.

The Act of Parliament establishing the force provided that all the police were to be mounted and efficiently equipped, but with as little brilliant display as possible. No person, said the Act, was to be appointed to the force "unless he be of sound constitution, able to ride, active and able-bodied, of good character, and between the ages of eighteen and forty years; nor unless he be able to read and write the English or French language." The minimum age was later increased to twenty-two. From the very first the mounted police force has attracted a high grade of men. University men and sons of peers have served in the ranks with the humblest. One of the best-known names in the English language, Dickens, appears in the record of the force because Francis Dickens, a son of Charles Dickens, was for several years an inspector. The work of the "mounties" requires thinking, and these men think for themselves. A trooper may be called on in emergencies to act in almost any conceivable capacity. Consequently the police are a body of self-reliant men.

The organization of the force was begun in the autumn of 1873. By October about 150 men had been sent to the temporary headquarters at Fort Garry, and on June 4, 1874, three divisions (about 200 men) left Toronto for the Northwest by way of Chicago, Saint Paul and Fargo. From Fargo they proceeded on horseback westward to the Saskatchewan. The hardships of this overland march are a part of the history of the great Northwest. How the police established their posts, how they broke up the illegal trade in whisky and stolen horses and cattle, how they won the fear and later the confidence of the Indians, how they really made possible the settlement of the Territories—these should be familiar stories to every school child.

Its Duties. There is scarcely a department of the Canadian government that is not assisted by these hardy troopers. Along the United States border they act as customs officials, preventing smuggling. They carry the mails to the distant settlements, they report on the condition of the roads, bridges, crops and weather, they fight prairie and forest fires, they take the census, and they often act informally as arbitrators or judges between settlers who have had disputes. They help travelers and are frequently called on to take care of the sick

or injured. For example, in the winter of 1904 word came to the police at Fort Chipewyan that a missionary had become insane at Peace Station. Constable Pedley took the madman to Fort Saskatchewan, 500 miles away by trail.



ROYAL NORTHWEST MOUNTED POLICE DISTRICTS

This was in the dead of winter, with the temperature often fifty degrees below zero, with terrible storms, during one of which Pedley had to lash himself and the missionary to a tree.

These duties, of course, are merely incidental to the main purpose of the force, to preserve law and order. In many of the remote districts they not only preserve the law but they frequently make or interpret it. The commissioned officers make regular trips to hold court. In tracking criminals these men have difficulties which seem almost insuperable. Only a handful of men to patrol thousands of square miles! Yet no detective or police force in the world can show a better record, and the efficiency of the police has earned for it the fear of all criminals and the admiration of all good citizens. The police regularly patrol all districts in which there are settlers. All over the prairies the mounted constables ride from homestead to homestead. Each constable carries a patrol sheet, on which any complaints of the settler are recorded. If nothing has happened to deserve the attention of the police, the constable writes "No complaints" and the farmer signs. The constable, too, is usually a man of experience, who can advise the farmer about matters pertaining to his crops or his herds. During the War of the Nations the "mounties" had the added duty of watching hundreds of alien enemies who were settled throughout the Northwest.

For a few years the Indians were the worst trouble makers in the Northwest, but even in its early days the police force had tremendous influence. As an illustration there was a famous episode shortly after the close of the Saskatchewan Rebellion. A band of 200 Indians, who feared punishment for their share in the rebellion, invited themselves across the border into the United States, where they met a cold welcome. The official wires were kept hot for a few days between Ottawa and Washington, and much correspondence ensued, until it was finally agreed that Canada would be responsible for the band if the United States would kindly escort it to the border. In due time 200 wild-eyed Crees, with 450 horses, were headed northwards in charge of a strong force of United States cavalry. At the boundary line they were met by three mounted policemen, one corporal and two troopers, who had with them one extra horse. The American commander looked at them in surprise.

"Where's your escort for these Indians?" he asked.

"We're here," answered the corporal.

"Yes, yes, I see. But where's your regiment?"

"I guess it's all here," replied the corporal. "The fourth man's looking after the breakfast things."

And the four "mounties" took over the band of Indians, and escorted them a hundred miles farther, where they could give Uncle Sam no more trouble.

Present Organization. The original number of 200 officers and men has been gradually increased until it has reached about 800. These are distributed over Alberta, Saskatchewan, Manitoba, the Yukon and the North West Territories. The force is divided into twelve main districts, each of which is commanded by a superintendent, who has under him a number of inspectors and other officers. Surgeons and veterinary surgeons are commissioned officers. The noncommissioned officers, as in the British army, are staff-sergeants, of various kinds, sergeants and corporals. The troopers are called constables. Each of the district headquarters maintains communication with all posts in its district, and is responsible for their direction to the central headquarters at Regina. The remotest detachments make their headquarters at Fullerton, on the northwest corner of Hud-

son Bay, and on Herschell Island, on the shores of the Arctic Ocean, 2,500 miles from headquarters at Regina. Regina is the residence of the commissioner and his assistant, who are the executive officers of the force. The permanent official head, the comptroller, resides at Ottawa. The Royal Northwest Mounted Police, although organized on military lines, is a civil body, and is under the direct control of the Premier. Both officers and men are entitled to pensions after twenty years of service, or a shorter period if they are compelled to retire on account of ill-health. W.F.Z.

ROYAL SOCIETY, THE, the oldest scientific society in Great Britain and the most famous in the world. The full title is the *Royal Society of London for Improving Natural Knowledge.* Its members are called "fellows," and the initials, F.R.S., meaning "Fellows of the Royal Society," are generally placed, like a college degree, after their names. The organization was incorporated with the sanction of Charles II in 1662, but it was in existence as early as 1645. In that year weekly meetings of London scientists were held, and their work and discussions were so learned that even in 1646 the association was sometimes called the "invisible college." Within a year after incorporation it was carrying on active correspondence on learned questions with the philosophers and scientists of France, Germany, Spain and Italy, and in 1664 began the publication of its famous *Transactions.* More than 230 volumes of these have been published since that year, and the series constitutes by far the most valuable record of scientific achievement in existence.

Within ten years after its incorporation the society published such valuable results of its research work that it was considered as semi-official by the British government, and was given many important scientific commissions. In 1671, the year Sir Isaac Newton was elected a fellow, the association was appointed to direct the Royal Observatory at Greenwich, and this duty was followed by such as the correcting of the calendar in 1752, the protection of British ships from lightning, the measurement of a degree of latitude, the Antarctic Expedition of Captain Cook in 1772, the Arctic expeditions under Parry in 1819, Sir John Franklin in 1845 and Nares in 1874, the determination of the density of the earth, the accurate comparison of the metric and English systems of weights and measures and other noteworthy undertakings. The society practically controls the British Meteorology Department, the National Physical Laboratory, several scientific trust funds and the governing bodies of many British public schools. It is doubtful whether any other scientific association in the world approaches it in scope and power.

Admission into the society is most difficult to secure, and therefore the right to sign *F.R.S.* after one's name is a much-coveted honor in the scholarly world. Fifteen new members may be received annually, and each candidate must be vouched for by six members. C.H.H.

ROYCE, JOSIAH (1855-), an American philosopher, some of whose works have been widely read because their pleasing style makes them of more interest to the general reader than are most works on philosophy. His *Spirit of Modern Philosophy,* for instance, has given many people a delightful introduction to the great philosophers of modern times, of whom otherwise they might have remained in ignorance. Royce is not, however, a merely popular writer; he is a scholar as well, and *The Religious Aspect of Philosophy, The World and the Individual, Psychology* and *William James and Other Essays on the Philosophy of Life* contain real contributions to his chosen subject.

RUBAIYAT, *roo bi yaht',* an Arabic word, used to designate any collection of quatrains, or four-line stanzas. In English, however, it is applied almost exclusively to one series of such verse—that of Omar Khayyam, translated by Edward Fitzgerald (see OMAR KHAYYAM). Several other English versions of the Rubaiyat have been issued, but that of Fitzgerald is by far the most popular, and justly so; for it is more than a translation; it is a genuine English poem, exquisite in its diction, yet reproducing most faithfully the spirit of the old Persian writer. Fitzgerald at times took liberties with the wording of his original, but never with its spirit, and the result is unique among translations. The following stanza is no less typical of the philosophy of the poem than of its manner:

> Come, fill the Cup, and in the fire of Spring
> Your Winter garment of Repentance fling:
> The Bird of Time has but a little way
> To flutter—and the Bird is on the Wing.

The stanza which is most quoted is probably the twelfth:

> A Book of Verses underneath the Bough,
> A Jug of Wine, a Loaf of Bread—and Thou
> Beside me singing in the Wilderness—
> Oh, Wilderness were Paradise enow!

Consult Brown's *Literary History of Persia.*

WORLD BOOK

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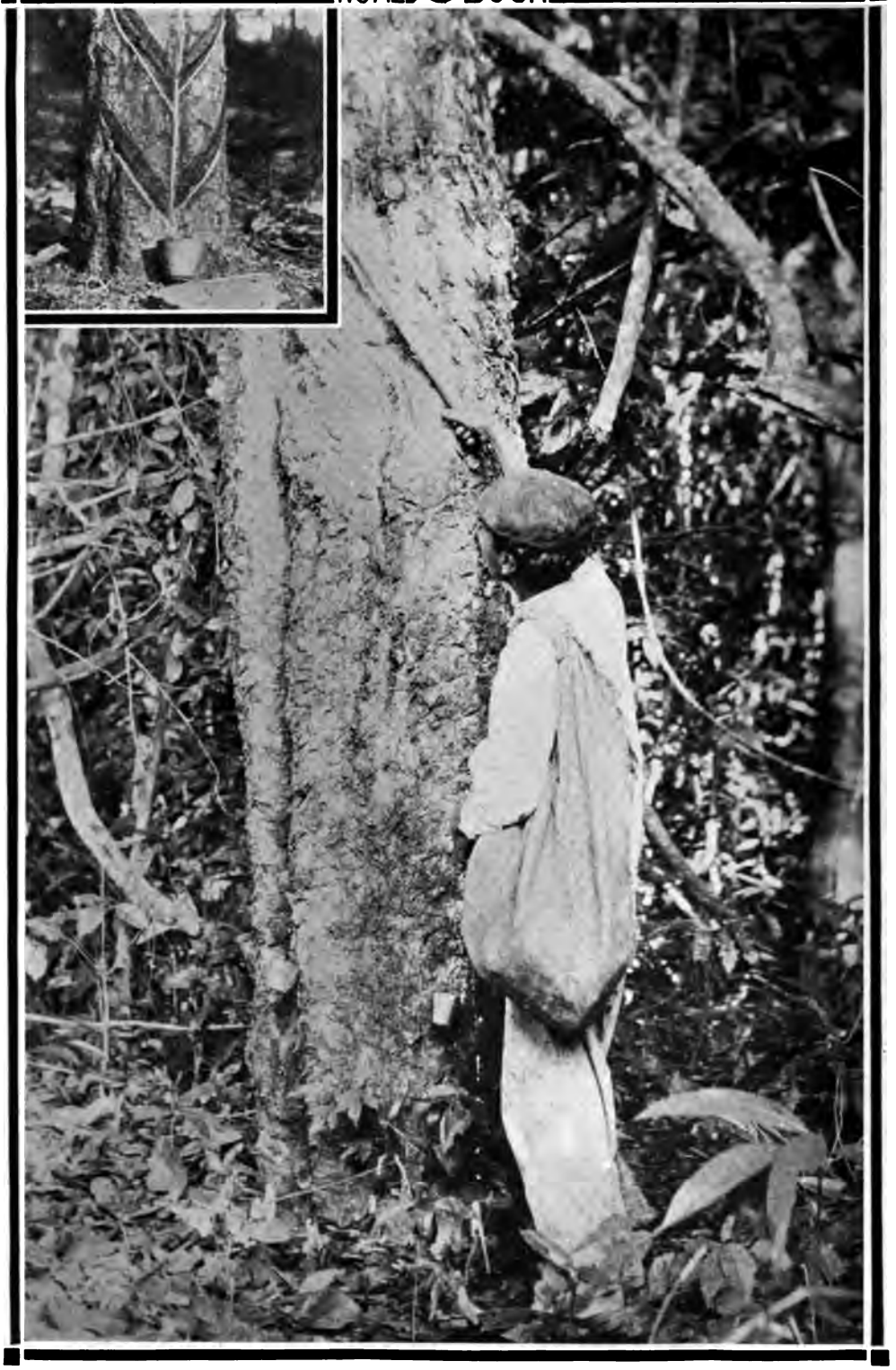
IN A RUBBER FOREST.

Gathering sap, or "latex," to take to camp for boiling. Boiling rubber and rolling into balls for shipment. The form in which the balls appear for export.



TAPPING RUBBER TREES.

A sharp knife grooves the trees, usually as shown in the small upper picture.

RUBBER AND RUBBER MANUFACTURE. Where does rubber come from? Do we dig it out of the ground? Does it grow on trees, or is it made by combining a number of different substances? Probably many boys and girls have asked themselves these questions without finding a satisfactory answer. Rubber does not grow on trees, but it is obtained from a number of trees, shrubs and vines that grow in hot countries.

How Rubber is Obtained. We are all familiar with the milkweed (which see), and know that it is so named because of its milky juice. Experiments lead us to believe that there is a little rubber in this juice, but the quantity is so small that it would take cartloads of milkweed to give us enough rubber to make a small rubber ball. There are, however, in the valley of the Amazon, in the central part of Africa, in the East Indies and in some parts of Mexico and the southwestern part of the United States a number of plants from which rubber is obtained in paying quantities. The most important of these plants is the *hevea,* or rubber tree, as it is commonly called, and it is from the milklike juice of this tree that most of the rubber is obtained.

When an incision is made through the bark, the juice flows out slowly. The trees are "tapped" by cutting slanting grooves in them. A small cup is fastened to the tree at the lower end of the groove to collect the juice, which is gathered every evening. A pail of this juice looks somewhat like a pail of milk, and if it is allowed to stand for several hours, the rubber will rise to the surface like cream. The gatherer makes a smoldering fire of leaves and a kind of nut that grows in the forest, then takes a wooden paddle, dips it into the juice and holds it over the fire until the water has been evaporated, leaving a thin coat of rubber on the surface. He then dips the paddle again in the juice and holds it on the fire, and continues to repeat the process until his paddle is covered with a thick coat of rubber. He then cuts this open on one side, takes it from the paddle and rolls it into a ball, like those shown in the picture. These balls are collected and shipped to market.

The average tree yields about two ounces of juice a day. One-third of this weight is rubber, and about ten pounds of rubber are obtained from a tree in a year. The rubber obtained from the *hevea* tree by this process is of the highest quality and is known as *Para rubber,* because it is shipped in greatest quantities from the city of Para, in Brazil.

While the greatest part of the rubber of commerce is obtained from the juice of certain trees and vines, no inconsiderable quantity is obtained from shrubs, vines and trees in which it occurs in solid form in stems and roots. The Congo region in Africa abounds in plants of this sort. The guayule, a shrub growing from three to five feet high, is becoming an important source of rubber. This plant is of special interest because it is found in Northern Mexico and in the southwestern part of Texas, and because it can be cultivated in these regions and in Arizona, where large plantations are in successful operation.

Uses of Rubber. Rubber is used for so many purposes that were the supply cut off a number of important industries would be destroyed. We should have no rubber boots or shoes; we should have to find some other waterproof material for our raincoats; pneumatic tires, in universal use for bicycles and automobiles, would have to be replaced with those of a less desirable material and we should be obliged to do without telephones until some other material as convenient and not a conductor of electricity could be found to take its place. Besides these greater uses for which rubber is employed it enters into the manufacture of many small articles which have become indispensable in the home and the office, such as combs, buttons, rubber bands, erasers and fountain pens.

The importance of rubber in modern warfare may be realized in a measure from the following incidents:

Practically all the commissary supplies and ammunition required by the American troops south of the Rio Grande in 1916 were transported in motor trucks. An automobile train of 18,000 cars was employed by the French

BRANCH OF RUBBER TREE

The illustration is that of the *hevea,* the source of Para rubber, the best in the world. When only a few months old the tree is as tall as a man, and eventually reaches a height of over a hundred feet.

to rush reënforcements and munitions to Verdun during the first hours of the great German drive against that fortress in 1916. Napoleon said that an army marches on its stomach; a modern army marches on rubber. Rubber is as vitally a contraband of war as iron, steel and gunpowder.

Rubber Manufacture. The balls of crude rubber, when received at the factory, contain dirt and other impurities. The cakes are cut into small chunks which are run through a set of rollers over which water is flowing. The rubber comes from the washing machine in irregular strips with rough surfaces. These strips are dried and then taken to the mixing machine, where sulphur and occasionally other substances are mixed with the rubber to adapt it to the uses for which it is desired. The prepared rubber, then in the form of sheets, is ready for manufacture into the goods for which it is designed. For tires, belts and shoes it is combined with duck or some other strong fabric by laying the sheet of rubber on the cloth and passing them between rollers which press them together. Tubing is made by passing soft rubber through a mold. Cloth for mackintoshes or raincoats is prepared by laying a thin sheet of rubber between two layers of cloth and pressing them together between rollers.

The Story of Rubber. The Spaniards who followed Columbus to the western world sometimes saw the natives playing with balls made of the hardened milky juice of certain tropical trees. Later they learned that by putting a coating of this juice over their coats or shoes they could make them waterproof, and that the natives of some of the countries molded water vessels of this material, and even boots, which when smoked looked very much like leather. The name India rubber, the India part of which is little used now, originated in the eighteenth century in England, where it was noticed that the substance would erase or rub out pencil marks. Another name is *caoutchouc,* a word supposed to be Brazilian for *weeping wood.* The French still say *caoutchouc.* The Germans prefer *gommi* and the Italians and Spaniards *goma,* words which remind us that foot rubbers were once known in America as gums or gum shoes.

Not quite a century ago rubber began to assume importance in the northern world. It was in 1820 that a sea captain brought to Boston the first of the famous gum shoes, made in South America by dipping shaped pieces of wool into the rubber juice; clumsy as they were, it is said that over a million of them were sold before a better process was discovered. In 1823 the Scotchman who has left us his name in the raincoats called mackintoshes took out his patent, which was for placing a very thin sheet of rubber between two layers of cloth. Meanwhile an Englishman, Hancock, had discovered that pure rubber can be made into blocks or sheets of any shape by mechanical pressure. But in spite of all these ingenious contrivances rubber would have remained of minor importance had it not been for a fortunate discovery made in America in 1839.

Vulcanization. The rubber goods made in these early times would make us laugh to-day. They were ordinarily rather sticky, and in hot weather very much so, while in cold spells they became stiff and somewhat brittle. Charles Goodyear, whose story is told in another volume, made an end of this disconcerting weakness when he found that rubber mixed with sulphur and then heated to the melting point

THE FLIGHT INTO EGYPT

legions in Gaul, a decree was passed by the Senate ordering him to disband his army. In defiance of this command he led a band of veterans across the boundary between Nearer Gaul and Italy—the Rubicon River—and marched into Rome. This was virtually a declaration of war against the republic, and was his first step toward gaining supreme power. Because of this event the Rubicon has a permanent place in history, and the expression "to cross the Rubicon" has come to mean the first decisive step in a hazardous enterprise, from which there is no turning back. The ancient river was about twenty miles long and emptied into the Adriatic. It is not known definitely with which stream it is identical, but best authority favors the Fiumicino.

RUBINSTEIN, *roo'bin stine,* ANTON GRIGOROVICH (1829-1894), a pianist and composer, was born at Wechwotynecz, Russia. His family was Jewish, but each member had been baptized in the Greek Catholic Church in 1830, when Czar Nicholas had threatened expulsion of all orthodox Hebrews. His mother, and a Russian teacher, named Alexander Villoing, gave him practically all the musical training he ever received, although for a short time in 1840 he attended the Paris Conservatory. It was soon discovered that his musical intuition and technique were so great that the various teachers he met could add little to his knowledge of the art. Liszt and Chopin became his close friends and genuine admirers, and under their advice he received some instruction in composition from great teachers in Berlin.

When Rubinstein was but sixteen years old he began to teach in Vienna, and two years later went to Saint Petersburg (now Petrograd), where, in spite of his Jewish blood, his playing aroused extraordinary enthusiasm. The Grand Duchess Helen became his patron, supplied him with money and gave him frequent opportunities to be heard in public. There, in 1851, his first opera, *Dimitri Donskoi,* was presented successfully. He was later advised by Helen to make a concert tour of the larger European cities, and in 1857 played in Hamburg, Leipzig, London and other musical centers. His appearances in London were in the nature of triumphs, for few pianists had ever been able to stir all classes of citizens as he did.

In 1858 he was appointed director of the Royal Russian Musical Society and four years later founded the famous Conservatory of Saint Petersburg. His frequent concert tours throughout Europe made him by far the most famous pianist of his day, and when, in 1872 and 1873, he appeared in America his reception was most unusual. Crowds followed him about the streets of the larger cities, the throngs at the theater doors fought for places in line, and audiences often arose and cheered when he had finished the playing of a composition. In 1889 the Russian government made him a nobleman, with the honorary title of Imperial State Councilor. He died in Saint Petersburg on November 20, 1894. His compositions are exceedingly harmonious, and are notable for the completeness of the melody in each. Among his most popular works are the *Ocean Symphony,* the *Dramatic Symphony, The Demon* and *The Maccabees,* and the piano compositions *Melody in F* and *Kaminoi Ostrow.* A great oratorio was *Christus.*

Consult MacArthur's *Life of Rubinstein.*

RUBLE, or **ROUBLE,** *roo'b'l,* the Russian monetary unit, equivalent to 51½ cents in United States and Canadian money. It is divided into 100 kopecks, each having a value of about ½ cent. Since the seventeenth century the silver ruble has been the standard in Russia, but its value has been fluctuating, and it is only since 1897 that it has remained fixed at its present value. The 15-ruble and the 7½-ruble pieces, known respectively as the imperial and the half-imperial, are issued in gold, while the half and quarter rubles are of silver. For the most part, however, little coin circulates in Russia, its place being taken by paper money.

RUBY, *roo'bi,* a transparent variety of corundum, and the costliest of all precious stones. It occurs in various shades of red, from deep scarlet to pale rose, but the most valuable ruby is that having the color of a pigeon's blood. True, or *Oriental,* rubies are found chiefly in Burma, Ceylon and Siam, but genuine stones of small size occur in Macon County, North Carolina, in stream gravels. Pigeon-blood stones come principally from Burma,

pomegranate-red from Ceylon, and garnet-hued from Siam. A ruby of good color, free from flaws, is worth many times as much as a diamond of the same size. There are several red stones on the market to which the name ruby is applied, but which are not genuine rubies. Some of these are imitations in glass. The so-called *Cape, Australian* and *Arizona* rubies are in reality fine garnets, and the *Siberian* ruby is red tourmaline. *Spinel* rubies are transparent red crystals of magnesium aluminate. Experts can readily distinguish genuine from spurious stones by tests as to hardness, specific gravity, etc. For the manufacture of artificial rubies, see GEMS.

According to the lore of precious stones the ruby is the birthstone for July, and the symbol for the fortieth wedding anniversary. It is believed by the superstitious that to dream of rubies is a sign of unexpected guests.

Consult Kunz's *The Curious Lore of Precious Stones.*

Related Subjects. The reader is referred to the following articles in these volumes:

Corundum	Garnet
Diamond	Gems

RUDE, FRANÇOIS (1784-1855), a French sculptor of highest rank, whose work is representative both of classic purity and of uncompromising realism. Among his finest achievements are *Mercury Fastening his Sandal, Neapolitan Fisher Boy* and a statue of Joan of Arc, all of which are in the Louvre. His artistic power is also revealed in the superb monument of *Godefroy Cavagnac,* in Montmartre. He studied at the School of Fine Arts in Paris and later went to Rome. His *Mercury Fastening His Sandal* and the *Neapolitan Fisher Boy* were his first successes. *Le Départ (The Departure)* is considered to be his greatest production. It was executed for the Triumphal Arch of the Star, and represents the departure of the volunteers from Paris in 1792.

RUFF, a species of sandpiper native to the eastern hemisphere. During the mating season the adult male develops a tuft of feathers on his neck, which is capable of being swelled out into a ruff, variable in color, changing from black, chestnut and reddish to buffy and whitish. He is also greatly disposed to fight at this season, boldly attacking intruders. The female is much more modest in plumage and in behavior, and is known as a *reeve.* Occasional specimens of the ruff have been taken on the coast of Eastern North America. See SANDPIPER.

RUFFED GROUSE, *grous.* See GROUSE, subhead *Ruffed Grouse.*

RUFFO, *ru'fo,* TITTA, an Italian baritone, born in Tuscany. At an early age he entered the Conservatory of Santa Cecilia at Rome, ambitious to fit himself for an operatic career. After two years of study he was told to select another profession, as his voice was not deemed equal to the success he coveted. But the youth believed otherwise. He was bent upon a musical career, and the criticism only made him the more determined, despite the fact that he was almost penniless and the choice of a profession could not be put off long. Undismayed, he went to Milan, where, under the instruction of Signor Cassini, he developed remarkable powers. Subsequently he sang in the larger cities of South America, and then made a triumphant tour of his native land. He made his début in the United States at the Metropolitan Opera House, New York, in 1912, and later appeared with the Chicago Grand Opera Company. Ruffo is admirable in dramatic as well as in lyric rôles, and has appeared in many of the world-famous operas. Among the operas in which he has won high honors are *Pagliacci* and *Hamlet.*

RUG'BY SCHOOL, one of the most celebrated of English public schools, was founded in 1567 at Rugby, England, through a bequest of Lawrence Sheriffe, a grocer of Rugby. The purpose of the founder was to establish a school for the boys of Rugby and the country adjacent to it. Because of litigation over the will the school remained in obscurity for the first hundred years of its existence. In 1688 it had only 100 students, and for the next hundred years the number did not increase. In 1777 Thomas James of Eton was elected head master. He introduced the Eton system of small, separate houses for the pupils, instead of lodging them all in one large dormitory, raised the standard of scholarship and improved the discipline. In sixteen years he increased the number of students from fifty-two to 245. Under his successor, Wooll, further progress was made. During the latter's administration the playground or "close" was enlarged, and Rugby football was developed.

But Rugby owes its reputation chiefly to Thomas Arnold, who became head master in 1828. When Arnold assumed his duties English public schools had reached a crisis, and there was a growing desire for the state to assume control. Taking conditions at Rugby as he found them, Arnold wrought changes that

within a few years extended to all the leading public schools of the country. He did not revolutionize the existing systems so much as he *humanized* them. He impressed his blameless life and strong personality upon every phase of the school's activities; he trusted the boys and made the upper classmen responsible for their own conduct and that of the boys in the lower forms. He emphasized the value of a religious and moral life and directed all the energies of the school to the building of character. His teaching and his sermons were an inspiration. Rugby soon became known from one end of England to the other, and to-day it is one of the most widely known schools in the world. The students number about 600, and the studies are mainly classical, but modern tendencies are making changes in the old order of subjects. Arnold's influence still remains, and no school stands above Rugby in scholarship and character. Rugby has become known to almost every schoolboy through *Tom Brown's School Days,* by Thomas Hughes, one of the school's most famous graduates. See ARNOLD, THOMAS.

Consult *Tom Brown's School Days,* noted above, and Rouse's *History of Rugby School.*

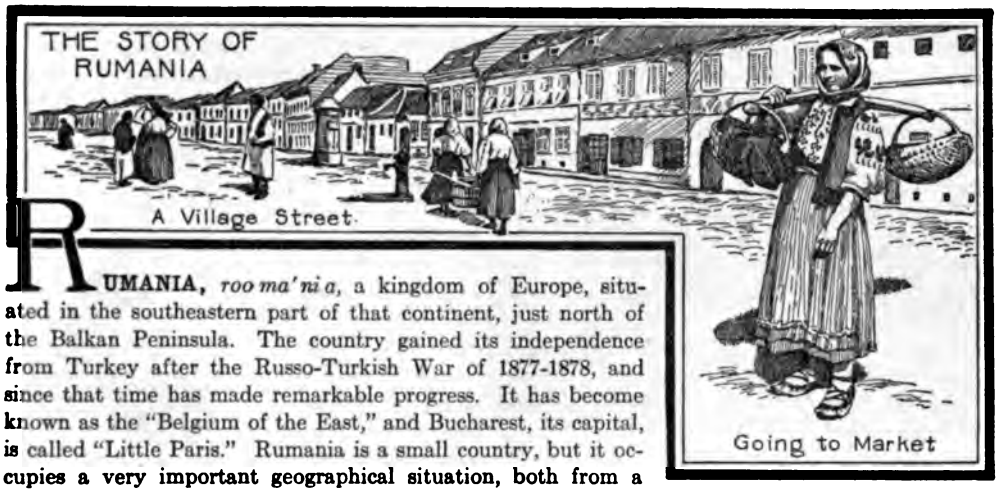
RUGS. See CARPETS AND RUGS.

RUISDAEL, *rois'dahl,* JACOB. See RUYSDAEL, JACOB.

RULERS OF THE WORLD. In the table below are listed the names of the rulers of the world, according to the status of each country in 1917. Each country listed is described under its title in these volumes:

COUNTRY	RULER	ACCESSION	TITLE
Abyssinia	Zeoditu	1916	Empress
Afghanistan	Habibulla Khan	1901	Ameer
Albania	No ruler since 1914		Mpret
Argentina	Hipolito Irigoyen	1916	President
Austria-Hungary	Charles I	1916	Emperor
Belgium	Albert I	1909	King
Bolivia	José Gutierrez Guerra	1917	President
Brazil	Wenceslao Braz Gomes	1914	President
Bulgaria	Ferdinand I	1887	Czar
Chile	Juan Luis San Fuentes	1915	President
China	Feng Kwo-Chang (Acting)	1917	President
Colombia	José Vicente Concha	1914	President
Costa Rica	Frederico Tinoco	1917	President
Cuba	Mario G. Menocal	1913	President
Denmark	Christian X	1912	King
Ecuador	Alfredo Baquerizo Moreno	1916	President
France	Raymond Poincaré	1913	President
Germany	William II	1888	Emperor
Great Britain	George V	1910	King
Greece	Alexander I	1917	King
Guatemala	Manuel Estrada Cabrera	1917	President
Haiti	Philippe Sudre Dartiguenave	1915	President
Honduras	Francisco Bertrand	1916	President
Italy	Victor Emmanuel III	1900	King
Japan	Yoshihito	1912	Emperor
Liberia	Daniel E. Howard	1912	President
Liechtenstein	John II	1858	Prince
Luxemburg	Marie Adelaide	1912	Grand Duchess
Mexico	Venustiano Carranza	1917	President
Monaco	Albert	1889	Prince
Montenegro	Nicholas I	1910	King
Morocco	Mulai Yussuf	1912	Sultan
Netherlands	Wilhelmina	1898	Queen
Nicaragua	Emiliano Chamorro	1917	President
Norway	Haakon VII	1905	King
Oman	Seyyid Taimur bin Turkee	1913	Sultan
Panama	Ramón M. Valdez	1916	President
Paraguay	Manuel Franco	1916	President
Persia	Ahmed Mirza	1914	Shah
Peru	José Pardo	1915	President
Portugal	Bernardino Machado	1915	President
Rumania	Ferdinand I	1914	King
Russia	Provisional Government	1917	
Salvador	Carlos Meléndez	1916	President
Santo Domingo	Frederico H. Carvajal	1916	President
Serbia	Peter I	1903	King
Siam	Vagiravudh	1910	King
Spain	Alfonso XIII	1886	King
Sweden	Gustaf V	1907	King
Switzerland	Edmund Schutthess	1917	President
Turkey	Mohammed V	1909	Sultan
United States	Woodrow Wilson	1913	President
Uruguay	Feliciano Viera	1915	President
Venezuela	Juan Vicente Gómez	1915	President

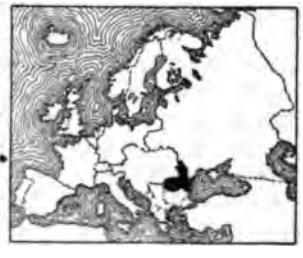
RUM, a strong alcoholic drink, produced mainly from molasses. The word is an abbreviation of *rumbooze, rum* being an Asiatic word for *good,* and *booze* a derivation of the German *bausen,* meaning to *guzzle.* The liquor is made by fermenting and distilling molasses and the refuse from the making of cane sugar. When first produced, rum is white and transparent, but is given a dark brown color by the addition of caramel and by being stored in casks that have contained sherry. Its strength and flavor increase greatly with age, and a cask that has been stored for as long as ten years will bring a higher price than almost any other form of alcoholic beverage. The finest quality is now produced in Jamaica, and takes its name from that island. It is an exceedingly strong liquor, containing sometimes as much as eighty-two per cent of alcohol, and should never be used except for medicinal purposes. See BACTERIA AND BACTERIOLOGY.



RUMANIA, *roo ma'ni a,* a kingdom of Europe, situated in the southeastern part of that continent, just north of the Balkan Peninsula. The country gained its independence from Turkey after the Russo-Turkish War of 1877-1878, and since that time has made remarkable progress. It has become known as the "Belgium of the East," and Bucharest, its capital, is called "Little Paris." Rumania is a small country, but it occupies a very important geographical situation, both from a strategical and a commercial point of view. It lies between two great rival powers of Europe—Russia and Austria-Hungary—a fact which has greatly influenced its historical development. It forms the easiest approach from the north towards the Balkan Peninsula and Constantinople, and it contains the mouth of the Danube, that very important artery of communication and commerce of Central Europe; thus it possesses the shortest water route between Central Europe and Asia. At the same time the extensive plain of the Danube constitutes the natural highway between the east and the middle of Europe. In proportion to its size Rumania is one of the greatest grain-producing regions in the world, and it possesses great mineral resources.

Size and Location. Rumania is bounded on the east by the Black Sea and Russia; on the north and west by Austria-Hungary, from which it is separated by the Carpathian Mountains, and on the south by Serbia and Bulgaria, from which, except in the extreme southeast, it is separated by the Danube. Seen on the map Rumania reminds one of a pair of pincers with its two jaws opened towards the northwest and enclosing between them the Austro-Hungarian province of Transylvania. The portion of the country which lies south of the Danube, known as the *Dobrudja,* was acquired by Rumania after the war of 1877-1878 in exchange for the southern part of Bessarabia, which was taken by Russia. The country has an area of 53,489 square miles, and is therefore nearly as large as Florida.

The People. Before the outbreak of the War of the Nations in 1914 Rumania had a population of 7,508,009, about the same as that of Pennsylvania. Over ninety per cent of this number were Rumanians. There were in the country about 250,000 Jews and 200,000 gypsies, besides a great number of Bulgarians, Serbs, Germans, Hungarians, Turks and Armenians. There were, perhaps, 4,000,000 Rumanians scattered through neighboring countries. The Rumanians belong to the Latin race and speak a Romance language, that is, one derived from the Latin. It is most like the Italian of all the Romance languages. Over eight-tenths of the people are peasants, and their chief occupation is agriculture. They passionately love their country, and the greatest desire of each farmer is to own the piece of land he tills. This feeling has been beautifully expressed by a modern poet, himself a peasant, in a poem entitled *We Want Land,* which has become the rallying song of the peasants. Until this hunger for land is appeased, and the just demands of the peasantry are granted, the social and economic fabric of the country cannot rest upon a sure foundation.



LOCATION MAP
Rumania's commercial and political importance is not to be measured by its size.

The principal towns are Bucharest, the capital; Jassy, Galatz, Braïla, Ploësti and Craiova.

Physical Features. The Carpathian Mountains extend in the form of a semicircle, and form the northern and western boundaries of

the country. They contain a number of rugged peaks 8,000 feet high, and present in several places fine mountain scenery. These mountains are usually covered with dense forests of fir and pines. Spurs of the Carpathians extend into the country for short distances and then the ground slopes gradually through a series of hills to the extensive level plain of the Danube, which is the characteristic surface feature of the country. Rumania is well watered by several rivers which run southward and flow into the Danube.

Climate. The climate is healthful, but it is subject to great extremes of temperature. The winters are bitterly cold, the plains being swept by cold winds blowing from the steppes of Russia. The whole country is covered by a thick mantle of snow for several months. The summers are very hot, the thermometer rising sometimes to over 100° F. in the shade. Spring lasts only a few weeks, but autumn is long and forms the most delightful season of the year. The rainfall is usually abundant, but the country suffers sometimes from droughts.

Natural Resources. *Agriculture.* Rumania is a very fertile country, its extensive plains being covered with a deep layer of rich, black soil formed chiefly of loess or alluvial deposits. Nearly one-third of its total area is under cereals. Corn, which forms the staple food of the people, is the chief crop; next in importance comes wheat. About 110,000,000 bushels of corn and about 90,000,000 bushels of wheat are raised annually. With better methods of agriculture the production could be greatly increased; the most primitive methods and implements are still used, except upon the large estates, where modern machinery is being introduced. Other grains raised in large quantities are oats, barley and rye. Nearly half a million acres are occupied by vineyards and orchards, and large quantities of grapes and all kinds of fruit are grown. There are a great number of plum trees in the country; the plums are mostly used in the distillation of a special alcoholic beverage which is the national drink.

In its extensive forests, which cover nearly 6,000,000 acres, Rumania possesses another important source of natural wealth. The chief trees are oak, beech, pine, fir, elm, willow and walnut.

Minerals. The country is rich in mineral resources. In the foothills of the Carpathians are found some of the most extensive oil basins in the world. Although the working of the oil fields dates only from the beginning of the twentieth century, Rumania occupies the fourth place among the oil-producing countries of the world. The output is about 1,750,000 tons a year. A pipe line owned by the government connects the principal oil field with Constantsa, the country's chief port on the Black Sea. In the foothills of the Carpathians are also found some of the most extensive deposits of salt rock in the world. The extraction of the salt is a government monopoly and some of the salt mines are worked by convicts who have been sentenced for life or for long terms. (Capital punishment does not exist in Rumania.) Other minerals found here are coal, iron, copper and gold. There is a great abundance of all kinds of building stones and of marble of good quality.

COMPARATIVE AREAS
Rumania has 53,689 square miles of territory; Florida's area is 58,666 square miles.

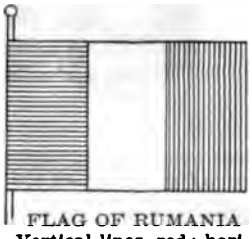
Commerce and Industry. Rumania has normally a thriving export trade in wheat, corn, other grains, oil, wood and flour. With the exception of numerous flour mills and several oil refineries, there are no industrial establishments of importance. The country is provided with a network of railroads, which traverse it both from north to south and from east to west. There are over 2,500 miles of railway, most of which are owned and operated by the government. The railway line to Constantsa is carried across the Danube at Cernavoda over a bridge eleven miles long. The Danube serves as a great artery of communication and trade, and the two neighboring towns of Braïla and Galatz, situated at the head of deep-water navigation, are the great grain-exporting ports of the country. The Danube is frozen for about three months each year.

Government. Rumania is a constitutional monarchy, the throne being hereditary in the male line of descent. The constitution under which the country is governed was adopted in 1866 and was modeled after the constitution of Belgium; it was twice amended, in 1879 and in 1884. The executive power is vested in the king and in a Cabinet of eight ministers, who are responsible to Parliament for their acts. The legislative power is vested in the Chamber

elected for four years, and in the Senate, which consists of 120 members, elected for eight years. The voters are divided into classes, called electoral colleges, the class distinction being based upon property owned, the amount of taxes paid or educational qualifications. This system deprives the peasants, the overwhelming mass of the people, of any representation in the Senate, and gives them only a small and inadequate representation in the Chamber of Deputies.

Religion and Education. The Rumanians belong to the Greek Orthodox Church, which is the official religious establishment of the state, but all religious bodies enjoy full freedom of worship. Education is free and compulsory, all the schools being maintained by the government, but the percentage of illiteracy is high. At the head of the educational institutions are the two universities, one at Bucharest and the other at Jassy.

History. The territory now included in Rumania was occupied in ancient times by a people called Dacians. The Roman Emperor Trajan conquered the whole region (101-106 A. D.) and brought here many Roman colonists. Known as Dacia, it was the first Roman province to feel the shock of the barbarian invasions. From the third until the end of the tenth century this region was invaded by various barbaric peoples who swept from Eastern Europe toward the southern and central parts. Finally, in the thirteenth century, the two independent principalities of Wallachia and Moldavia were constituted. After the Turks conquered the Balkan Peninsula in the fourteenth century these two principalities recognized the suzerainty of the sultan of Turkey and became autonomous provinces of the Ottoman Empire. During the nineteenth century Russia acquired a right of protectorate over both Wallachia and Moldavia. But the national spirit began to awaken and the desire for the union of both provinces and their independence became very strong. The Congress of Paris of 1856 put the principalities under the joint protection of the Great Powers. In 1859 Moldavia and Wallachia elected as their ruler the same prince, and thus became united under the name of Rumania. In 1866 the prince resigned and Charles of Hohenzollern was called to the throne. The country remained under the nominal suzerainty of the sultan of Turkey until 1877, when the Russo-Turkish War broke out. Rumania then declared its independence and joined Russia in the war. The young Rumanian army played an important part in the capture of Plevna, which decided the outcome of the war. The Congress of Berlin (1878) formally recognized the independence of the country. In 1881 Prince Charles proclaimed himself king.



FLAG OF RUMANIA
Vertical lines, red; horizontal lines, dark blue; plain surface, yellow.

THE ROYAL COUPLE
King Ferdinand and Queen Marie of Rumania.

Rumania did not take part in the first Balkan War against Turkey, but helped Serbia and Greece to defeat Bulgaria in the second Balkan War. By the Treaty of Bucharest (August 7, 1913) it obtained from Bulgaria a stretch of territory in the Dobrudja, amounting to 2,969 square miles, with a population of 275,000.

In the War of the Nations Rumania remained neutral at the beginning, although manifesting strong sympathies for the allies. In the hope of gaining the provinces of Transylvania, Bukovina and Banat, and liberating their oppressed kinsmen from the rule of Austria-Hungary, they finally entered the war on the side of the allies; war was declared against Austria-Hungary on August 27, 1916. Soon afterwards the Rumanian armies invaded Transylvania, against the advice of the English and the French, who preferred that they wage a defensive campaign. The central powers launched then a strong offensive, and after a campaign lasting only three months the country was overrun, and more than half, including entirely the Dobrudja, was occupied by the enemy. After the fall of Bucharest (December 6) the seat of the government was moved to Jassy. The Teutonic powers found the rich oil fields and fertile grain lands in the conquered territory of material value to them; they transferred nearly all foodstuffs at once to Germany and Austria-Hungary, and brought the people in the subjugated area to the direst want. The corn, wheat and rye of Rumania

Outline and Questions on Rumania

I. Position

(1) Latitude
(2) Longitude
(3) Boundaries
(4) Importance of position
  (a) Relation to Russia and Austria-Hungary
  (b) Easiest approach to Balkan peninsula
  (c) Contains mouth of Danube

II. Size

(1) Actual, 53,485 square miles
(2) Comparative
(3) Population
(4) Addition of the Dobrudja

III. Country and Its People

(1) Physical features
  (a) Carpathian Mountains
  (b) Danube plain
(2) Extremes of climate
(3) Rainfall
(4) The people
  (a) Races
  (b) Language
  (c) Education
  (d) Religion

IV. Resources and Industries

(1) Agriculture
  (a) Methods
  (b) Chief crops
  (c) "We want land"
(2) Forests
(3) Minerals
  (a) Oil
  (b) Other products
(4) Commerce and transportation

V. Government and History

(1) Constitutional hereditary monarchy
(2) Legislative branch
(3) Early history
(4) Independence achieved
(5) Balkan Wars
(6) War of the Nations

Questions

Why has the capital of this country been called "Little Paris" (see Bucharest)?

Give three ways in which the geographic position of Rumania makes it of importance.

What is the Dobrudja, and when did it come into the possession of this country?

What state of the American Union does Rumania most closely resemble in size?

Is it more or less densely populated than is that state?

Is the state which it most closely resembles in number of inhabitants larger or smaller than the country?

What poem has become the rallying song of the Rumanian peasants?

How many countries produce more corn than does Rumania? How do these countries which surpass it in production compare with it in size?

For what are plums chiefly used in Rumania?

By what name was this territory known to the Romans? What part did it play in Roman history?

What part did it play in the War of the Nations?

helped to modify the rigorous food-control laws in Germany during 1916 and 1917. O.B.

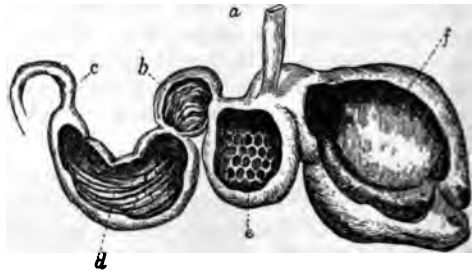
Consult Kirke's *Domestic Life in Rumania;* Miller's *The Balkans,* in Story of the Nations Series.

Related Subjects. The reader of this article on Rumania is referred to the following topics in these volumes:

Balkan Wars	Danube
Bucharest	Greek Church
Carpathian Mountains	Russo-Turkish War
Corn	War of the Nations

RUMELIA, *roo me'li a,* a name formerly given to that part of the Balkan Peninsula which was under the rule of the Turkish Empire.

RUMINANTS, *roo'mi nants,* the name applied to grazing animals which chew the cud, and which are further characterized by their split hoofs. They include camels, llamas, deer, sheep, goats, giraffes, pronghorns, antelopes,



CROSS SECTION OF STOMACH

(*a*) Oesophagus; (*b*) psalterium; (*c*) duodenum; (*d*) abomasum; (*e*) reticulum; (*f*) rumen, or first stomach.

cattle; that is, nearly all the mammals of greatest economical importance. With the exception of the camel they have no incisor, or cutting, teeth in the upper jaw, the place being occupied by a callous gum, against which the lower incisors bite. The mouthful of grass is mixed with saliva and swallowed into the paunch. Later, when the animal is resting, the mass of food is propelled upward into the mouth by a muscular action similar to vomiting, and the food is slowly masticated by a kind of rotary motion of the jaws, called "chewing the cud." The cud is swallowed again and passes at once into the second cavity, called the *honeycomb bag,* a name referring to the cells which form its lining, and which are like those of a honeycomb. The food is then assimilated. The ruminants are a division of that group of the animal kingdom known as ungulates (which see).

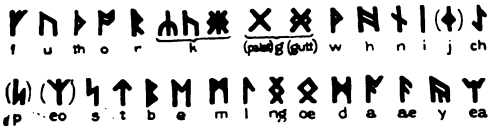
RUMP PARLIAMENT, *pahr'li ment,* in English history, the name given to the remnant of

the Long Parliament which, in conjunction with Cromwell's army, brought about the condemnation of Charles I. On December 6, 1648, two regiments under the command of Colonel Pride entered the House of Commons, for the purpose of forcing its members to condemn the king. The majority of the members were imprisoned or driven out, and only sixty of the more violent Independents were permitted to retain their seats. The clearance was called *Pride's Purge,* and the sixty members, forming the *rump,* or fag-end, of the Parliament, were known by the name of the Rump Parliament ever afterward. When the Rump attempted to make a stand against certain demands of the army in 1653, Cromwell filled the House with soldiers, pulled the Speaker out of the chair, cleared the room, and declared the Parliament to be dissolved. It was revived twice after this, and in March, 1660, it decreed its own dissolution.

Related Subjects. The reader is referred to the following articles in these volumes:

Commonwealth of England
Cromwell, Oliver
Long Parliament
Restoration

RUNES, *roonz,* the earliest written characters used by the Teutonic races of Europe. The name came from a word which meant *secret,* and was closely akin to the word for *magician,* thus showing that these characters were



ANGLO-SAXON RUNES

originally known only to a few, probably the heathen priests. Indeed, they were at first used exclusively in charms and incantations, though later inscriptions of all sorts, on monuments, slabs, coins and willow wands, were scratched in runic characters.

The origin of the runes, as well as the date of their invention, is unknown, but it seems probable that they were derived from the Latin alphabet and that they were in use as early as the third century A. D. Traces of their use are to be found in Germany, France, Spain, England, Denmark, Norway and Sweden, but the three last-named countries have the great majority of runic monuments. The runes were made entirely of straight lines, probably because it would have been difficult to scratch curves on wood. The Norsemen themselves ascribed the invention of the sacred characters to Odin, chief of the gods, who was supposed to have scratched the first specimens on his spear. Thus they were always identified with heathen worship, and the earliest Christian missionaries to the countries where they were in use did their best to replace them with the Latin alphabet. The runes were retained in Scandinavia far longer than in any other region.

RUNJIT SINGH, *run jeet' sing* (1780-1839), a ruler of the Punjab, India, and founder of the Sikh kingdom, was the son of a Sikh chieftain. His father died when Runjit was six years old, and the government fell to his mother. When he was seventeen Runjit rebelled against his mother, gained control of the government and directed all his energies to founding a kingdom which should unite all the Sikh provinces. He was granted Lahore by the shah of Afghanistan, and within a few years subdued all the northern provinces. The chiefs of the provinces to the south asked for British protection, and in 1809 an agreement was reached whereby the Sutlej River became the southern boundary of Runjit's dominions. With the aid of British and French officers Runjit then organized his army after European models and made a complete conquest of the Punjab, over which he assumed rule under the title of maharajah, or king of kings. In 1836 he suffered a severe defeat by the Afghans, but continued to rule over the territory until his death.

RUNNIMEDE, *run'i meed,* a meadow of interesting historical associations, because it was there or near there that the barons of England compelled King John to sign the Magna Charta, on June 15, 1215. Runnimede is twenty miles southwest of London, in Surrey. It lies on the right bank of the Thames River and is used as a race course. Whether the signing of the charter took place in the meadow or on an island near by is a matter of dispute. See MAGNA CHARTA.

RUPEE, *roo pe',* in the monetary system of British India, the unit of value and the standard coin. Such coins have been current since long before British occupancy—since the middle of the sixteenth century, in fact; but they have varied largely in value. In 1832 the weight of the rupee, which is of silver, was fixed by the British at 180 grains, troy weight, of which 165 grains were to be pure silver, and this has remained the fixed standard to the present day. Of necessity the value of the coin has fluctuated as silver has risen and depreciated in value, and this has proved to be a

source of much distress. In 1899, to remedy this defect, the government fixed the value at one-fifteenth of a pound sterling, or about 32 cents of United States or Canadian money, and in that ratio it has since remained legal tender.

The rupee is in size between the United States quarter-dollar and half-dollar pieces. It bears on its obverse side the impression of the British sovereign, on its reverse the words *One Rupee* and the date of coinage. Legally it is divided into 16 annas, and there are issued in silver 8-anna, 4-anna and 2-anna pieces. The sum of 100,000 rupees is commonly spoken of as a *lakh* of rupees, while 10,000,000 rupees constitute a *crore*.

RU'PERT, PRINCE (1619-1682), one of the main supporters of the royal cause in the struggle between Charles I of England and his Parliament. He was the son of Frederick V, Elector Palatine, and Elizabeth, the daughter of James I of England, and he played an important part during the Thirty Years' War.

When the civil war broke out in England, he was made leader of his uncle's cavalry and fought valiantly at Worcester and at Edgehill. Charles I did not find him as tractable as he wished, however, and for his surrender of Bristol, in 1645, dismissed him from his service. Later he became commander of the royalist fleet, but in the days of the Commonwealth was defeated by Admiral Blake. Escaping with a few ships, Prince Rupert made his way to the West Indies, where he engaged in piratical adventures. When Charles II came to the throne (see RESTORATION) he returned to England and served in the fleet during the war against Holland. The later years of his life were given up to scientific investigations.

RU'PERT'S LAND, a name formerly applied loosely to the Canadian Northwest, and more especially to the land surrounding Hudson Bay. This vast region, whose boundaries were only vaguely determined until the Dominion was organized in 1867, was named in honor of Prince Rupert, the first governor of the Hudson's Bay Company. This territory was granted to the company by Charles II of England and was only surrendered by the company in 1869, when the title was transferred to Great Britain. In 1870 title was formally transferred to the new Dominion of Canada. As a part of Canada the Northwest was originally called "Rupert's Land and the North West Territories," but the term Rupert's Land is no longer in use.

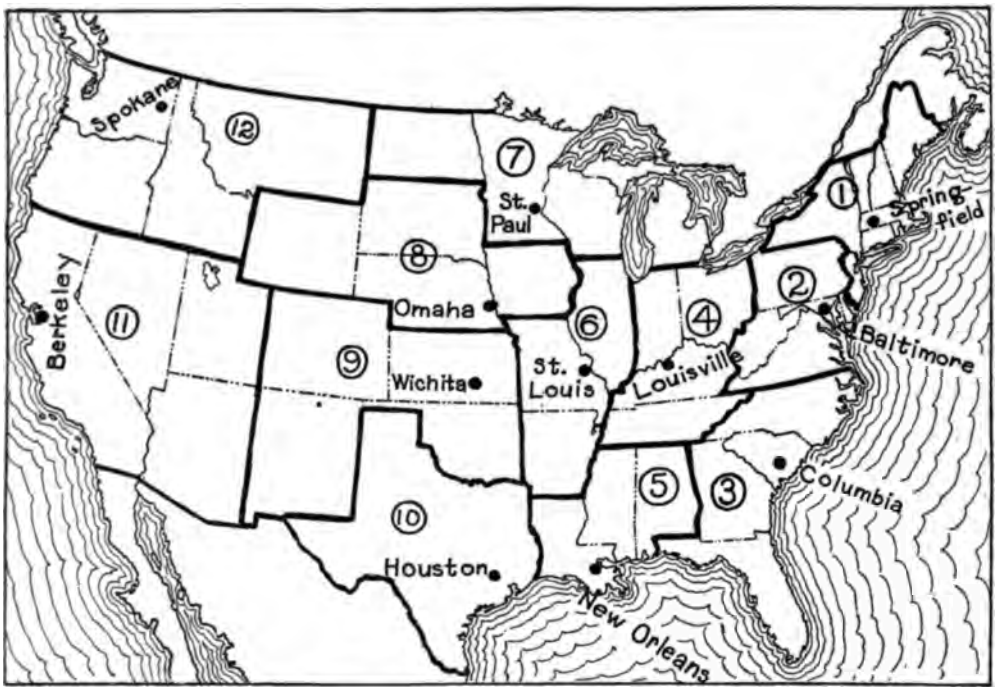
RUP'TURE. See HERNIA.

RURAL CREDITS. On July 17, 1916, President Wilson signed the Federal Farm Loan Act which provides for a national system of rural credits for the United States. The law is elaborate and covers all conceivable cases that may arise in connection with loaning money on land and securing the loans by first mortgages. From beginning to end the law is in favor of the farmer. The following are its most important features:

The Federal Farm Loan Board. A Federal Farm Loan Board consisting of five members is created, of whom the Secretary of the Treasury of the United States shall be one. The other members are appointed by the President, with the concurrence of the Senate; not more than two of these members can belong to the same political party. No member of the board shall, during his continuance in office, be an officer or director in any institution, association or partnership engaged in banking or in the business of making land mortgage loans or selling land mortgages. The members of the board are required to devote their entire time to the work; each receives a salary of $10,000 a year and his traveling expenses. One of the members is designated by the President as Farm Loan Commissioner.

Federal Land Banks. The Federal Loan Board was required to divide the United States into twelve districts, to be known as Federal land bank districts, to establish in each district a Federal land bank and to designate the city in which the chief office of the bank should be located. These districts and cities are shown in the map on page 5109. Each bank is under the management of a board of directors. When a bank is organized the Federal Farm Loan Board appoints five directors, who choose one of their number as president, one as secretary and one as treasurer. When the subscriptions to the stock of the bank amount to $100,000 a permanent board of nine directors, each holding office for three years, is selected. Six of these directors are chosen by the national farm loan associations, and three are appointed by the Federal Farm Loan Board. One-third of the members of the first board retire at the end of one year, one-third at the end of two years and one-third in three years, their successors in each case being elected for three years.

Every Federal land bank is required to have a subscribed capital of at least $750,000 before it can begin business. The capital stock is divided into shares of five dollars each, and it may be subscribed for and held by any indi-



FEDERAL LAND BANK DISTRICTS

The city shown in each district is the location of a land bank and a farm loan board; these have jurisdiction over all rural credits in the district.

vidual, firm or corporation, or by the government of any state or of the United States. Stock held by national farm loan associations cannot be transferred nor assigned for security.

National Farm Loan Associations. The Federal land banks make their loans through national farm loan associations, which are organizations of persons who wish to borrow money on land, giving a first mortgage for security. Each association chooses a board of directors, and they select a secretary-treasurer, who is the executive officer of the association. His duties consist in collecting and receipting for all money received, such as interest, partial payments on loans, and principal, and forwarding the same to the Federal land bank in the district in which the association is located. He is also required to pay to the borrower the money loaned him by the Federal land bank.

The stock of these associations is divided into shares of five dollars each, and each applicant for a loan is required to subscribe for one share for every $100 or major part thereof which he borrows, paying cash for his stock when he applies for his loan. The stock is held as security for the payment of the loan, and is retired and paid in full when all payments have been met by the borrower. Each national farm loan association must have at least ten members, and it cannot begin business until the loans applied for amount to at least $20,000.

How to Secure a Loan. Any farmer desiring to borrow money under this law should take the following steps:

1. Join the national farm loan association nearest to the locality in which he lives or in which his land is located, paying in five dollars for one of its shares for every $100 he wishes to borrow.

2. Make application to the association for the loan, giving his personal note therefor, secured by a first mortgage on his farm.

3. The land is then examined by authorized members of the association and an appraiser of the Federal land bank. If the application is approved the bank forwards the money to the secretary-treasurer of the association, who pays it over to the farmer. No commission, brokerage or "rake-off" is charged the farmer, and the rate of interest cannot exceed six per cent.

Advantages. The law confers the following advantages on the farmer:

1. It gives him the privilege of borrowing money to the amount of his security without having to pay high commissions and a high rate of interest.

2. It provides for long-time loans not less than five nor more than forty years—on a plan

of partial payments each year, so that when the loan falls due the final payment will be small.

3. It recognizes a number of purposes for which money may be borrowed. These are:

(*a*) To purchase land for agricultural purposes.

(*b*) For equipment, fertilizers and live stock.

(*c*) For erecting or improving buildings.

(*d*) For discharging a prior mortgage.

Restrictions. The law places the following safeguards around these loans:

1. It will not make a loan on land that is not occupied or tilled by the owner.

2. Loans cannot be made for less than $100 nor for more than $10,000.

3. The borrower is required to spend the money for the purposes for which it was loaned to him.

4. The amount of the loan cannot exceed fifty per cent of the value of the land and twenty per cent of the value of the buildings and other insurable property on it. W.F.R.

Consult Morman's *Principles of Rural Credits;* Herrick's *Rural Credits.*

RUSH, a reedlike plant of the sedge family. The common rush is characterized by slender, leafless stems which grow in clumps to the height of two or three feet. Rushes are found in marshes along the banks of streams and in shallow water near the shores of lakes and ponds. The stems are strong and flexible and are employed in making baskets and mats, chair bottoms and ropes. The stems of the *scouring* rush contain particles of silica and are useful in brightening tinware and other metallic household utensils. In Shakespeare's time candles called *rushlights* were made by dipping in grease rushes stripped of the green outer coat. See BULRUSH; HORSETAIL RUSH.

RUSH, BENJAMIN (1745-1813), an American physician, prominent in almost all of the great public movements in the early history of the United States. He was born at Byberry, Pa., graduated from Princeton at the age of fifteen, and in 1768 took his medical degree at Edinburgh University. In the next year he began to practice in Philadelphia, becoming at the same time professor of chemistry at the Medical College in that city. He had a great interest in all reforms or philanthropic movements. Thus in 1774 he helped to found the first American antislavery society, of which he was for many years secretary, and later president. The Rush Medical College, in Chicago, was named for him.

He was a member of the Continental Congress, a signer of the Declaration of Independence, and during the first two years of the Revolution saw active service in the field as surgeon-general. The founding of Dickinson College was due largely to his interest in free education, and the first dispensary in the United States was established by him in 1785. After 1787, when he was a member of the Pennsylvania committee for the ratification of the Federal Constitution and one of the framers of the state constitution, he took little part in public life, devoting himself to his practice and to his professional duties at the University of Pennsylvania. During the yellow fever epidemic of 1793 he did extremely efficient work, for which he received various honors. He was treasurer of the United States mint from 1799 until his death. Rush's writings are numerous, and include dissertations on topics of general interest as well as on medical subjects.

RUS'KIN, JOHN (1819-1900), a great English art critic, social reformer and writer, born in London. His parents were well-to-do Scotch people who attended most carefully to the training of their son, securing for him the best private instruction and taking him about with them on their extensive travels through England and Scotland. Moreover, his moral and spiritual development was helped by his early familiarity with the Bible, and by the practical righteousness that he saw in the lives of his father and mother.

JOHN RUSKIN

Surrounded by favorable conditions, he began to write both prose and poetry even before beginning his course at Oxford (1837), and while at the university he won the Newdigate prize for his poem called *Salsette and Elephanta.* In the year after his graduation he produced the first volume of his great work of art criticism, *Modern Painters,* and other volumes appeared at intervals during the next seventeen years. Ruskin's original intention in this work was to prove that modern landscape painters, and especially Turner, were superior to the old masters, but his design broadened as he went on until the work came to be a comprehensive discussion of art. Before this work was finished Ruskin published

The Seven Lamps of Architecture and *The Stones of Venice,* both intended to instruct his readers in architectural subjects.

Until 1860 he devoted himself chiefly to the criticism of art, but in that year, with the appearance of *Unto This Last,* he declared himself a social reformer. He then actively interested himself in improving the conditions of the English working classes, and spent the greater part of the fortune which his father left him on philanthropic undertakings. He greatly improved the condition of several London tenement houses, and established a model village called Saint George's Guild, where the inhabitants were to live in true social unity. He also founded and endowed educational institutions of various kinds, and otherwise proved himself most earnest in his service for humanity. His influence was widespread and always wholesome.

From 1871 to 1879 and from 1883 to 1884 he was Slade professor of fine arts at Oxford. After resigning from this position he lived at Brantwood near Coniston Lake until his death.

Greatest of his works produced after 1860 are *Fors Clavigera,* letters written for English workingmen; *Sesame and Lilies,* delightful essays on literary and educational subjects; *Ethics of the Dust; The Crown of Wild Olive; The Queen of the Air,* a discussion of Greek cloud and storm myths; *Mornings in Florence,* and *Praeterita,* a rather sketchy review of his life. Ruskin's influence on art was very strong, for in *Modern Painters* he showed the need, never before clearly recognized, of accurate observation of nature as a basis of painting. But artists were not the only people he aided—all his readers were helped to a clearer perception of the beauties of the world about them. His prose is unsurpassed in its word painting, and in its melody approaches poetry. Most important of all, he helped men to realize that "free-heartedness and graciousness, and undisturbed trust, and requited love, and the sight of the peace of others and ministry to their pain—these and the blue sky above you, and the sweet waters and flowers of the earth beneath, and mysteries and presences innumerable of living things" are the substance of wealth and the objects of labor. A.MC C.

Consult Benson's *Ruskin: A Study in Personality;* Harrison's *John Ruskin,* in English Men of Letters Series.

RUSSELL, *rus'el,* Lord John, First Earl Russell (1792-1878), an English statesman, twice Prime Minister. He was the third son of the Duke of Bedford, was born in London and educated at Westminster School and the University of Edinburgh. In 1813 he was elected to Parliament and from the first showed himself an ardent advocate of Parliamentary reform. Catholic emancipation and the repeal of the Test Act also enlisted his efforts, and when, in 1830, Earl Grey became Premier on a platform of Parliamentary reform, Lord John was made paymaster-general. With the passage of the Reform Bill of 1832 he was intimately associated. From 1835 to 1839 he was home secretary, and when Peel went out of office, in 1846, Lord John Russell became Premier.

He remained in this office until 1852, and his most effective work was the quieting of the turmoil in Ireland. His administration saw, too, the agitation known as Chartism and the unsuccessful attempt of the Roman Catholic Church to reëstablish itself in England. Defeated in 1852, Lord John served from December of that year to 1855 as foreign secretary, and in the latter year represented England at the conference of Vienna. As foreign secretary under Lord Palmerston, he showed hearty sympathy for the Italians in their efforts toward union, and according to his critics violated British neutrality during the American War of Secession by his attitude on the Alabama question and the Trent affair. In 1865 he again became Prime Minister, but resigned the next year because of the defeat of a reform bill. The remainder of his life was spent in literary pursuits. He was raised to the earldom seventeen years before his death.

RUSSELL, John Scott (1808-1882), a Scottish engineer, born near Glasgow. His father, a clergyman, had destined his son for the ministry, but yielded before the decided talent for science which the boy showed. After studying at the universities of Saint Andrews, Edinburgh, and Glasgow, and doing some practical work in the shops, Russell began to lecture in Edinburgh on science. In 1832-1833 he filled the chair of natural philosophy at the University of Edinburgh, and the next year began his noteworthy studies of wave motions, which resulted in his proposal of a new system of shaping vessels. He himself built after his new system the *Great Eastern,* with which the Atlantic cable was laid, and the *Warrior,* the first sea-going armored frigate. He wrote various papers on naval architecture, and the *Wave of Translation,* which was published after his death.

RUSSELL, Sol Smith (1848-1902), an American actor who became famous as an impersonator and comedian. His name is most often associated with the play *A Poor Relation,* in which his best acting was shown. He was born in Brunswick, Me., and at the beginning of the War of Secession he joined the Federal army as drummer boy. In 1862 he left the troops to play the drum, act and sing in a small theater in Cairo, Ill. In 1874 Smith became a member of the Augustin Daly organization and made his first stellar appearance in 1880 in *Edgewood Folks,* presented over 1,500 times. He played best the parts which combined the whimsical and the gentle, and he found an excellent vehicle for his peculiar talents in *Peaceful Valley* and in *A Poor Relation,* both of which were written especially for him.

RUSSELL SAGE FOUNDATION, an institution established by the widow of Russell Sage, by which $10,000,000 of the great fortune left by him has been dedicated to the highest social uses. The Sage Foundation was established in 1907, with the endowment named above, "for the improvement of social and living conditions in the United States of America." But it does not seek to improve conditions merely by relieving poverty and distress; it is ambitious to remove the causes which result in poverty. It aims to open the way for people to earn a living wage, to occupy sanitary homes, to eat wholesome food, to live clean lives, to bring up sturdy, wholesome children.

In order to accomplish its aims the Foundation is divided into a number of organizations. It has a charity organization whose sole purpose it is to increase the efficiency of other charities. It has a department which promotes improved methods of dealing with dependent, defective, neglected and delinquent children. It has a child hygiene department, which aims to promote the physical and mental progress of children by providing them with playgrounds, sports, etc. There is a committee on the prevention of blindness and a committee for improving the methods and efficiency of loan associations. Its most conspicuous branch is probably the Russell Sage Foundation Homes Company, which has built at Forest Hills Gardens, on Long Island, near New York City, a group of the most attractive and convenient homes possible for a small amount of money. These houses are rented to people with moderate incomes. The headquarters of the Foundation are in New York City. See Sage, Russell, subhead *Margaret Olivia Slocum Sage.*

RUSSIA, a vast European and Asiatic country that includes within its boundaries one-sixth of the land and one-twelfth of the people of the earth, and the one whose government for many years was the most conspicuous example of absolute despotism, excepting possibly Turkey. Its rulers for over XX years were oppressors of their subjects and disbelievers in freedom of speech, popular government and education of the masses. Yet the democratic ideals that have wrought such great changes in the world were kept alive in the benighted country by heroic men and women, thousands of whom suffered exile in Siberia for their faith, and in 1917 the people threw off the chains that bound them, deposed their czar and proclaimed themselves a self-governing nation.

Russia extends from the Baltic Sea on the west to the Pacific Ocean on the east, and from the Arctic Ocean on the north to the Turkish dominions, Persia, Afghanistan, India and China on the south. Its greatest extent from east to west is 7,000 miles, or more than twice the distance from New York to San Francisco. Its extreme northern and southern points are 2,400 miles apart. The area of this vast country is

8,764,585 square miles. It is over twice as large as Canada, and is also more than twice as large as the United States, exclusive of Alaska. Excluding Eastern Siberia, the entire region is one vast plain, broken only by the Ural Mountains. Excepting along a portion of its western boundary, Russia is separated from adjoining countries by natural barriers.

Russia is divided into many provinces, and within its domains are found numerous races and nationalities. The following table gives the area of the largest political divisions and their population, according to statistics of 1914:

PROVINCE	AREA IN SQUARE MILES	POPULATION
European Russia	1,867,737	128,864,300
Poland	43,804	12,247,600
Caucasus	181,173	12,921,700
Siberia	4,831,882	10,000,700
Central Asia Provinces	1,366,832	11,103,500
Finland	125,689	3,241,000
Water	347,468	.....
Total	8,764,585	178,378,800

All Russia is usually divided into Russia in Europe and Russia in Asia. This article is devoted to European Russia, or Russia in the ordinary application of the term. The other important political divisions are described under their respective titles (see index at close of this article). The descriptions and statistics are based upon conditions as they existed just before the outbreak of the War of the Nations.

The People of Russia. Of the 178,000,000 people in all Russia, about 129,000,000 are found in European Russia. Three-fourths of these are Slavs, or true Russians, who are divided into three branches—the Great Russians, the Little Russians and the White Russians. The Great Russians number about 65,000,000. They occupy all of the central part of the country and constitute about three-fourths of the population in the eastern and northern sections. The Little Russians, also known as Ruthenians, or Ukrainians, numbering about 20,000,000, are settled in the southeastern part of the country. The Cossacks (which see) have the same speech as the Little Russians. The White Russians occupy four governments, or provinces, in the west. There are also about 6,000,000 Russians in the Asiatic provinces.

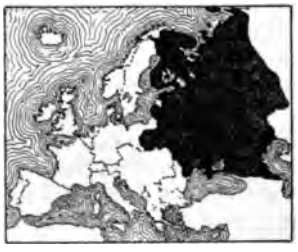
In the northwestern provinces of Finland and Lapland there are about 3,500,000 Finns, and at the outbreak of the War of the Nations 2,000,000 Germans were living in the provinces bordering on the Baltic. The Jews, of whom there are over 5,000,000, are most numerous in the southwest and west and in Poland. Russia has more Jews than any other country—more than half of the number in the world. The region between the Black and Caspian seas, known as the Caucasus, is peopled by Armenians, Kurds, Persians and other tribes. There are about 5,000,000 Turco-Tatars in the country, and 3,500,000 Lithuanians. Asiatic Russia contains Mongols, Kalmucks and many other native tribes.

Religion. The state religion is the Greco-Russian, called the Orthodox Catholic faith. Until the revolution of 1917 the Czar was the head of the Church. The Holy Synod is the governing board, and the procurator, its chief officer, has very large powers. The principal churches and monasteries in Russia possess rich stores of vestments, some of comparatively high antiquity, which are preserved with scrupulous care and used on occasions of great ceremony. The Orthodox Catholics number over 87,123,600; Dissenters, about 2,204,000; Roman Catholics, 11,500,000; Protestants and other Christians, 5,030,000; Jews, 5,450,000; Mohammedans, 13,907,000. All religions are officially tolerated. See GREEK CHURCH.

Physical Features, Plants and Animals

Surface. Russia in Europe includes the western portion of the great plain that extends eastward to the Bering Sea, broken only by the low range of the Ural Mountains. The plain is not absolutely level. There are low hills, or undulations, and stretches of broken country, but no point has an altitude exceeding 1,400 feet. The general level of this plain in Europe is from 400 to 600 feet. In the interior there are heights of land extending in a north and south direction. One, known as the Valdai Hills, separates the plains bordering on the Baltic from the low country of the Upper Volga region. Its highest point is about 1,200 feet. The Heights of the Volga extend along the right (west) bank of that river from Nizhni Novgorod to Tsaritsin, a distance of 730 miles, and reach an altitude of over 1,300 feet. In the southeast is the largest area in the world below sea level, the basin of the Caspian, whose waters are ninety-six feet below the Mediterranean. Every ocean bordering upon Russia may be reached without crossing a mountain range.

The Ural Mountains, forming a part of the boundary between Russia and Siberia, are low mountains whose highest peaks do not exceed 5,000 feet, and are broken by cross valleys into three sections, known respectively as the Northern, Central and Southern Urals. These and the Yaila Mountains, on the south coast of the Crimea, are the only mountains in Russia proper, but in the Caucasus, extending between the Black and the Caspian seas, there is a range whose snow-capped peaks of 18,000 feet rival the Alps in grandeur.



LOCATION MAP
Russia in Europe occupies over half of that continent.

Rivers and Lakes. The river systems constitute a distinguishing feature of the great Russian plain, whose extent was favorable to the development of the largest rivers of Europe, excepting the Danube. Most of the streams have their sources about the central height of land, from which they flow in all directions. With few exceptions the rivers are deep, with slow currents and channels so completely worn that their waters are navigable for boats of light draft almost to their sources. According to their drainage the rivers are divided into the following systems: the Arctic Ocean and the Baltic, the Black and the Caspian Seas.

The Arctic system includes the rivers flowing into the Arctic Ocean and the White Sea. The most important of these are the Petchora, rising in the Ural Mountains; the Northern Dvina, noted for its volume of waters, and the Onega. The latter flows into the White Sea.

The Baltic system includes the Neva, the outlet of Lake Ladoga, a stream of great volume upon whose banks Petrograd is situated; the Düna, sometimes called the Western Dvina; the Vistula, flowing through Poland and having the Northern Bug for its principal tributary, and a number of smaller streams.

From west to east the principal rivers from Russia flowing into the Black Sea are the Dniester and the Bug, both of which are navigable; and the Dnieper, the second largest river of Russia, draining an area as large as France. The Don flows into the Sea of Azov, an arm of the Black Sea. Its chief tributary is the Donetz.

The chief river flowing into the Caspian Sea is the Volga, the largest river of Europe, called in national songs *Mother Volga*. Another river emptying into this sea is the Ural, whose shallow waters contain an abundance of fish. The Oka and the Kama are tributaries of the Volga.

There are thousands of lakes in Finland and the other provinces bordering on the Baltic. Lake Ladoga, the largest, has an area of 7,000 square miles and is about the size of Lake Ontario. Lake Onega, about one-half as large, is the second in size, and Lake Peipus is third. Many of the lakes are connected by streams, and in the far north some of them blend with the marshes of the lowlands.

Climate. The surface of Russia is reflected in its climate. From the great extent of the country one would expect to find marked differences and sudden weather changes, yet this is not the case. The absence of lofty highlands and the southerly slope of the principal watersheds so modify the differences in latitude that in traveling from one portion of Russia to another they are scarcely noticeable. The Arctic Ocean exerts some influence over the climate of the extreme north, but the Baltic and the Black seas are too small to affect so large a plain. The climate is therefore continental; that is, the winters are cold and the summers warm. The difference between the mean summer and winter temperature amounts to 40° F. in some parts and to 63° in others, the difference increasing from south to north, at the rate of about 9.7° F. for each degree of latitude. From west to east the difference in temperature is more marked. The temperate winds from Western Europe raise the mean temperature of the western part of the country, but the southeast winds from Asia are cold and raw. There is, of course, a marked difference between the region bordering on the Arctic Ocean and that around the Black Sea. The former lies within the Arctic zone and is in the grip of ice and snow for about eight months each year; the latter lies in the warm temperate region, where the grape and the olive thrive. The transition from one extreme to the other, however, is gradual. The average temperature of Petrograd is 15° F. for winter and 64° for summer, and the temperature at Odessa is about the same as that of Boston.

The rainfall is less than that required for agriculture in the United States. It decreases from the northwest to the southeast. It is eighteen inches at Petrograd, fourteen inches at Kazan and 4.8 at Astrakhan. A heavy mantle of snow covers the entire country during the winter, and contributes immeasurably to the fertility of the soil.

In Petrograd the longest day lasts eighteen hours and forty-five minutes. For two months, during the long winter, there is practically no

sunlight. In the southern part of the country the length of day and night corresponds to that in the northern half of the United States for the same season of the year.

Plants. The Arctic zone of vegetation, whose southern boundary practically coincides with the Arctic Circle, consists of the tundra (which see), and this is frozen a large portion of the year. Here the plants consist chiefly of mosses and lichens, a few hardy shrubs, and, in places where humus has accumulated, flowering plants which can withstand the severity of the climate. South of this is the great belt of evergreen or coniferous forests, which extends southward to an irregular line drawn from the Gulf of Finland to the southern end of the Ural Mountains. To the south and west is the hardwood forest, which blends on its southern and eastern border with the grassy plains or steppes that occupy the southeastern portion of the country.

The larch, silver fir, birch and other trees characteristic of a subarctic climate are found in the northern part of the forest belt. This border gradually merges into the grand forest of magnificent evergreen trees, in which pine and fir predominate. Forest areas separated by impassable marshes, dense thickets and numerous lakes are the leading features of this region.

The hardwood forest, or oak region, as it is sometimes called, occupies all of Central Russia, and is characterized by a rolling surface and forests of oak, birch and other hardwood trees interspersed in sandy places with Scotch pine. The forests are separated by open spaces occupied by farms and villages, imparting to the landscape a pleasing variety of woodland and meadow.

In their native condition the steppes were covered by a luxuriant growth of wild grass and flowers. Such trees as the wild cherry and wild apricot are found on the slopes bordering streams, and thickets of willows are found in the depressions. However, nearly all this region has been changed by cultivation and fertile fields and green pastures are seen on every hand.

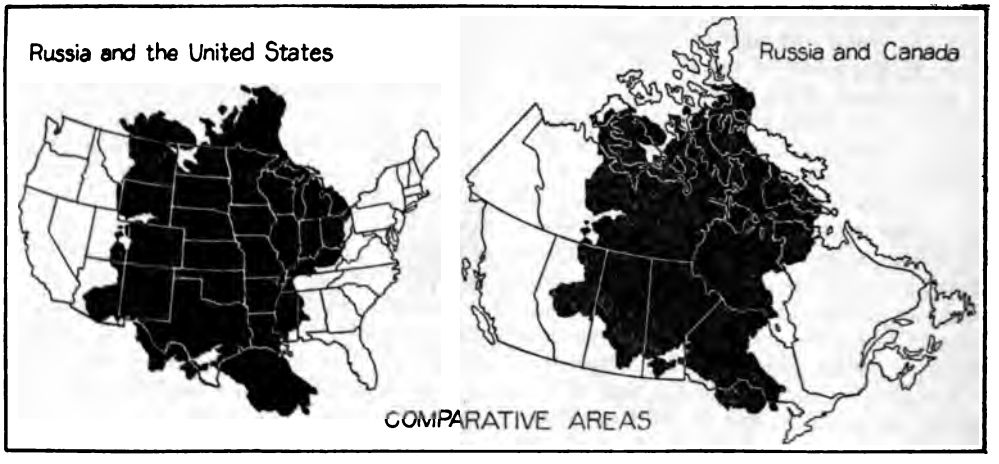
Animals. In the region within the Arctic Circle the seal, the polar bear and the reindeer are found. The great forest south of this region is the home of many fur-bearing animals, although some of the most valuable species have been nearly exterminated by hunters. Here are found bears, wolves, foxes, the elk and various species of deer, the wild boar and the glutton. In the more open forests of the central part of the country, squirrels, hares and many other small animals occur in large numbers. The agricultural region contains a number of animals of the marmot family, which, because of their destruction of crops, are pests. During summer the fields and forests of the entire country are enlivened by the flight and song of birds common to the cool temperate regions of Europe and North America. In the north thousands of wild geese, ducks and other water fowl frequent the marshes during the nesting season. The lakes and rivers abound in fish, and the Russian farmer, like farmers in other temperate regions, suffers yearly losses from insect pests.

Sources of Russia's Wealth

Minerals and Mining. The country has great mineral wealth, but owing to the scarcity of fuel and lack of transportation facilities mining has not until recently been developed as rapidly as in other parts of Europe. However, since 1900, the coal and iron industries have made rapid progress, owing largely to investments by French and Belgian capitalists and the introduction of modern, scientific methods of mining and smelting. The chief mining regions are the Ural Mountains; the government of Ekaterinoslav, north of the Sea of Azov; the province of the Don Cossacks, east of Ekaterinoslav; Baku, in the extreme southeast, and the Donetz coal region in Poland. The minerals mined in largest quantities are coal, iron, platinum, copper, petroleum and salt. Gold is found in small quantities.

The Ural Mountains are the great source of platinum, and over nine-tenths of the world's supply comes from them. The most important coal mines are in the Donetz basin, and iron is obtained chiefly from the southern provinces. In 1914 Russia was producing three-fourths of the coal, four-fifths of the pig iron and practically all the steel used in the country. Copper is obtained in the Ural Mountains and in the Caucasus. Baku contains one of the largest oil fields in the world. Salt is obtained from mines and wells in Poland and other localities, and a large proportion of the world's supply of manganese comes from the Caucasus region.

Fisheries. The waters on the northwest coast and the rivers and lakes abound in the best varieties of food fish, including cod, salmon, sturgeon and other varieties. The northwest



EUROPEAN RUSSIA AND THE UNITED STATES AND CANADA COMPARED
If Siberia were added to the black area the vast combined sweep of Russia would be over twice as great as the area of either of the great American democracies.

coast and the Caspian Sea and rivers flowing into it are the chief sources of the industry, and the annual catch from all sources amounts to over 1,500,000,000 pounds.

Agriculture. Agriculture is the chief occupation of about seven-eighths of the population of European Russia. The variation in temperature and rainfall over so wide an extent of territory makes a variety of agricultural interests necessary. In the extreme north agriculture cannot be practiced, but elsewhere crops can be grown. In the region of the great forest there are but few farms, but throughout the great area south of an east and west line passing through Petrograd most of the land not forested is under tillage. In the southeast is the great black-earth region, constituting one of the greatest wheat countries in the world. It is from this region that Russia exports under ordinary conditions about 100,000,000 bushels of wheat each year, making it second only to the United States as a wheat-exporting country.

Next to wheat the most important crops are rye, barley, sugar beets, flax and potatoes. Russia raises more than one-half the rye grown in Europe, and it produces more barley than the United States.

The live-stock industry is important and is especially profitable in the south, where the animals go without shelter throughout the year. Russia produces in normal times more and better horses than any other country in Europe. It has more swine than any other European country except Germany, and large numbers of cattle, sheep and goats. The cattle are raised chiefly for meat and hides.

Until recently the land was all in large estates; these were rented in small divisions to peasants who live in community villages, or *mirs*. The proprietors have never resided upon the land, and the methods practiced by the tenants have been wasteful in the extreme. American machinery and implements have been introduced to a considerable extent into the black-earth region, and these have had their influence in improving methods of tillage and harvesting, but elsewhere throughout the country primitive methods and implements long since out of date are employed. In 1906 a new land law became effective whereby large areas of land are passing into the hands of peasant proprietors. This movement is encouraged by the peasant land bank, which extends to the purchasers loans on easy terms of payment. Movements adopted by the *zemstvo* (see subhead *Government*) for improving agriculture include the establishing in each district of an agricultural museum, a meteorological station and a depot for the sale of agricultural machinery. Under the new régime it is expected that there will eventually be a new system of land tenure; a better era in agricultural development will then follow.

Forests. Russia has the most extensive forests of any country except Canada, and the felling and shipping of timber is an important industry, providing a living for a large number of people. During the winter thousands who would otherwise be idle work in the forests. Wood is the chief fuel; coal is beyond the means of the peasants. Little or no attention is given to the preservation of forests, and the

wasteful methods of cutting timber now practiced will soon deforest large areas. In the pine forests, for example, trees without number are felled for the purpose of making tar and turpentine. In other regions they are ruthlessly destroyed for making potash. The timber exported is valued at about $86,000,000 a year, in normal times.

THE BLACK-EARTH BELT

This "granary of Russia," which extends across Southern Russia, is one of the most fertile as well as one of the most extensive arable plains on the globe. It owes its name to a layer of blackish humus, varying in thickness on the average from one foot and a half to five feet.

This black-mold belt stretches in one long band across the whole of European Russia. Notwithstanding its faulty cultivation, this region, like the Mississippi Valley, is one of the world's immense storehouses of grain.

Manufactures. Manufactures are stimulated by a high protective tariff on imports and by the abundance and variety of raw material. Nevertheless, the manufacturing industries are far behind those of the countries of Western Europe. The factory system common to Germany, England and America is almost unknown. With the exception of the iron and steel industry, nearly all manufacturing is carried on in small shops and mills, many of which are located in the country; besides, thousands of the peasants are engaged a portion of the year in their own homes in the manufacture of such articles as hats, household utensils, linen and woolen goods and leather. The majority of the people who work in these establishments engage in farming during the summer. Bialystok, Lodz, Moscow, Petrograd and Warsaw are the chief manufacturing centers.

In order of the value of output, the leading manufactured products are textiles, including cotton, woolen and linen goods; iron and steel, including agricultural implements; sugar, of which enough to supply the country is manufactured from beets; and leather and leather goods.

Commerce. Commercially, Russia forms t connecting link between Asia and Europe. To the countries of Western Asia it is a source of supply of manufactured products; to those of Western Europe it furnishes agricultural products and raw material for manufactures. Because of lack of facilities for travel and transportation, the old method of exchanging products at fairs is still followed to a considerable extent, and it is estimated that at least 16,000 fairs are held within the Russian dominions each year. Nizhni Novgorod has for several centuries been the home of the most noted of these gatherings. Each large city has wholesale houses, and some of them do an extensive business. Local trade is carried on chiefly in small shops (see FAIR; NIZHNI NOVGOROD).

Transportation. During all the centuries of its existence the rivers of Russia have been the great highways of commerce and civilization. It was down the Dnieper that the fleets descended against Constantinople and brought Greek civilization to Kiev. The Dnieper made Russia Byzantine, the Volga made it Asiatic, and the Neva made it European. Nearly all the navigable rivers are connected by canals, and boats can pass from the Caspian and the Black seas to the Baltic. The Black and the Caspian seas are also connected by waterways, as are the Baltic and the White seas. Although the rivers and canals are closed by ice from a fourth to a half of the year, fully one-third of the freight is transported by water. The total navigable mileage of rivers and canals in European Russia, exclusive of Finland, is 153,780 miles. Of this mileage, 20,670 miles are navigable for steamers. The most important seaports are Archangel, on the White Sea; Petrograd, on the Neva; Riga, on the Baltic; Odessa, on the Black Sea, and Astrakhan, on the Caspian.

European Russia has 36,000 miles of railway, and Asiatic Russia about 11,000 miles; about two-thirds of this mileage is under control of the government. Moscow is the chief railway center, and the southern half of the country has very good railway facilities, although in construction and equipment the Russian railways are inferior to those of America. The Trans-Siberian Railway (which see) is one of the most extensive systems in the world, yet one of the poorest in equipment.

The country roads in summer are poor, but during the winter they are greatly improved by the snow.

Social and Political Conditions

...al. Many conditions have ... prevent civilization in Russia from ...ing as rapidly as it has in the countries ...f Western Europe. Chief among these causes are the extent of the country, with a consequent diversity of interests; the great number of races represented in the population; a land system which has been exceedingly oppressive to the common people, and a bureaucracy which has administered the government in its own interests. Russian society may be divided into three classes: the aristocracy, which until 1917 held almost absolute sway over the nation; the great middle class, including professional men, merchants and other business men and those peasants who have acquired wealth and obtained education; and the ordinary peasantry, constituting by far the largest part of the population, the majority of whom live in extreme poverty and ignorance.

The assimilation of these classes and the direction of their united energies to a great national purpose is a task requiring not years or decades, but at least a century. But, notwithstanding these great obstacles, many of the Russian people in large cities have made wonderful progress in education, literature, science and art, and their scientific and literary organizations, museums and art galleries compare favorably with those of other European countries.

As a whole, the Russian people are sentimental, poetical, truthful, superstitious and satisfied to live modestly and simply. They possess wonderful patience and endurance under hardship. They are not understood by those who have not lived in the country and are frequently misrepresented and called an inferior race, a supposition disproved by the achievements of their great men in literature and science, and by the steady advancement of the nation towards a greater freedom.

Education. The people of Russia, like those under every other despotic government, have had their struggle for better education. While the wealthy classes enjoyed the greatest privileges of education, the masses were kept in ignorance. For a century military and theological schools were the only institutions of higher education that were well patronized or that received government aid. They are respectively under the direction of the Minister of War and the Holy Synod. The system of primary schools is now securing a larger attendance of pupils and proportionately extending its influence, and the schools contain several excellent features. In many villages a garden or field in which the pupils may be taught practical agriculture is connected with the school. In 1914 there were ten universities, with a total enrolment of 40,000 students. There were also a number of secondary, technical and special schools and there were more than 8,000,000 pupils in the elementary schools. One of the encouraging features of the 1917 revolution was the interest shown in education by those who formerly were kept in ignorance. Their thirst for knowledge will be satisfied as the country develops under a stable government.

Government. Previous to the revolution of 1917 the government of Russia was aptly characterized as "a constitutional monarchy under an autocratic czar." Until October 30, 1905, Russia was an absolute monarchy with the supreme authority vested in the czar. He was assisted by a Council of Ministers, known as the Council of the Empire. The members of this Council were appointed by the czar and were responsible to him only. In 1905 a constitution providing for an elective assembly was granted (see DUMA). The Council of the Empire was made the Upper House of the Parliament, and the Duma, the Lower House. The czar held the power to dissolve the Duma at his pleasure, and the first assembly was promptly dissolved because of criticism of the acts of the government. The country as a whole is divided into large districts called *governments*, because the chief officer over them has the title of *governor*. These governments as political units correspond to the Canadian provinces, or the states of the American Union. Each government has a deliberative assembly, and some have military governors in addition to civil governors.

Partial local self-government is provided through the zemstvo, members of which are elected by the peasantry, the landowners and householders in towns; the zemstvo is the deliberative assembly of the district. Each zemstvo consists of sixty or sixty-five members and meets annually. The duties of the zemstvos pertain to the welfare of the district. In some districts agriculture and education have been materially advanced through their efforts.

The smallest unit of government is the commune, or *mir*, whose chief officers consist of a tax collector, treasurer, school trustees, hospital inspectors and a chief executive called the star-

osta. These officers are elected by the communal assembly, which has power to pass resolutions affecting the welfare of the commune. It is the duty of these officers to see that the resolutions are made effective.

For details of government under the new régime, as it existed after the forced abdication of the czar, under the provisional government in charge of Kerensky, see subhead *The Revolution of 1917*, below.

History of Russia

The Early Period. The earliest history of Russia consists of legends. These tell us that in the middle of the ninth century the Slavs and Finnish tribes inhabited the forest region around Lake Ilmen, between Lake Ladoga and the upper waters of the Dnieper. In 859, because of dissension, these tribes invited the Scandinavians, under their leader, Kurik, to enter the country, assume rule over it and protect it from invasion by other tribes. The beginning of Kurik's rule marks the date of the foundation of the Russian Empire. He died in 879, and Oleg, a member of his family, was made regent for Kurik's son, and by him the capital of the country was removed to Kiev. At the beginning of the twelfth century the Russian Slavs occupied scarcely one-fifth of European Russia. The history of the country for the four following centuries was one of war, rebellion and intrigue, during which the Russian people increased in numbers and extended their domain.

Beginning of Modern Russia. Previous to the Romanoff dynasty, which began with Michael Feodorovitch (1613-1645), the Russian rulers were of very little interest to history. Russia's progress as a nation began with the reign of Peter the Great, the "Father of Modern Russia." He introduced into the government many of the ideas and methods of the more progressive nations of Western Europe, founded Saint Petersburg (now Petrograd), inaugurated shipbuilding and advanced other industries, and in many ways welded his vast domain into a strong, centralized power. Some of Peter's ideas were strenuously opposed by the nobility, and for a brief period after his death the movements he had commenced languished. However, under Catharine II (1762-1796) Russia again made rapid advancement in civilization and was fully recognized as a great power. It was during her reign that Poland was partitioned, and 180,000 square miles of territory with 6,000,000 inhabitants were added to Russia. Two successful wars were waged against the Turks, who were compelled to release their control over Crimea and other possessions in what is now Southern Russia. Under Alexander I serfdom was abolished in the Baltic provinces (see SERFS), and a number of improvements in the government were made. He joined Austria against Napoleon, but their combined armies were defeated at Austerlitz (which see). Later Alexander entered into an agreement with Napoleon whereby he acquired Finland and the Aland Islands from Sweden, and compelled Turkey to cede to Russia the territory between the Dniester and the Pruth. In 1812, however, Alexander joined the alliance against Napoleon, whose overthrow he was largely influential in accomplishing. At the Congress of Vienna which followed, the Duchy of Warsaw was ceded to Poland, which was under control of Russia.

At the beginning of Alexander's reign the people were led to hope for a more liberal policy on the part of the government, and for some relief from the oppression they had endured under his predecessor. Their hopes were not realized, and a rebellion broke out when his successor, Nicholas I, ascended the throne in 1825. During the reign of Nicholas I Russia extended its dominions in Asia, and began the conquest of the Caucasus. In 1853 Nicholas began a war against Turkey which led to the interference of France and Great Britain, by whose influence Russia was compelled to relinquish most of the advantage it had gained through its victories.

Abolition of Serfdom. Alexander II was noted for his abolition of serfdom throughout the Empire in 1861, thereby setting free more than 20,000,000 men. A state system of loans was also provided, whereby many of the freed men were able to purchase small farms. In 1864 the zemstvos were instituted. But notwithstanding these reforms there was a growing spirit of revolution throughout the country. This led to the increase of government espionage and the issuing of orders which restricted the freedom of speech and of the press. Many political suspects were arrested and transported to Siberia. In 1877 war was again declared against Turkey and vigorously prosecuted. In less than a year the Russian forces had advanced almost to Constantinople, when the

other European powers intervened and again deprived Russia of its long-coveted prize, a southern outlet to the sea. On March 13, 1881, Alexander II was assassinated in Saint Petersburg by revolutionary conspirators.

Alexander III, who succeeded to the throne in 1881, was noted for his extreme reactionary policy. During his reign Russian dominions in Asia were extended; the persecution of the Jews became so cruel as to call for protests from other nations; the Trans-Siberian Railway was begun, and an alliance was formed with France which has continued to the present time.

Recent History. Alexander III died in 1894 and was succeeded by his son, Nicholas II, who was deposed in 1917. The new czar had traveled extensively in his Asiatic dominions and was thoroughly acquainted with the needs and possibilities of this part of the Empire. The Trans-Siberian Railway was completed, and other important lines in Asia were constructed. At the close of the war between China and Japan in 1895 Russia secured from China the lease of Kwang-tung Peninsula for twenty-five years. This was erected into a province, the port of Dalny was opened, and a strong naval station was established at Port Arthur.

Another treaty with China provided for the construction of the Manchurian Railway, and under pretense of guarding the railway Russia assumed military occupation of Manchuria. These measures had been strenuously opposed by Japan, and in 1904 that country declared war against Russia. In the brief conflict, which lasted about a year, Russia was disastrously defeated, chiefly because of lack of preparation and the long distance of the seat of war from the center of government.

But of far greater significance than the war were the social and political movements within the Empire to which the war gave a strong incentive. For more than a century there had been almost constant friction between the aristocracy and the people, and during the last half of that century the zemstvos had been educating the people in democracy. The strained relations occasionally led to riots and attempts at revolution. These disturbances were quelled by the police or the army, and the leaders were usually executed; nevertheless, the spirit of democracy continued to increase.

The most intelligent classes realized that Russia's defeat in the war with Japan was the result of the inefficiency and corruption of the bureaucracy, which the czar was unable and apparently unwilling to control. In addit to this, the government had refused to gr relief from an intolerable land system, un which thousands of people were starving i land whose crops were feeding the nations Western Europe. Moreover, the great railw within the Empire had been built with f eign capital, and foreign capital had also fo that certain Russian industries offered a de able field for investment. With the introd tion of foreign capital came a limited num of men—engineers, superintendents and skil workmen—and from these men the Russ peasant learned of the conditions of the lab ing classes in other countries. Comparison these conditions with his own increased discontent.

Within the government were two faction the extreme conservatives, who were constan advocating more drastic measures of repressi and the liberals, who counseled moderation a advised the czar to yield to the most urg requests of the people. The conservative f tion was in control, and petition after petit was denied until the tension between the g ernment and the people reached the break point. Then came the revolution of 1905, augurated by a series of great strikes. In attempt to break the strike in Saint Petersb over 500 innocent people, many of them wom and children, were killed, and over 3,000 w wounded by the police and the soldiers. T best political authorities of Russia agree t by this act the government separated its from the people beyond all possibility of rec ciliation.

The ruling power finally realized that it w unable to control the situation by repress measures, so the czar granted a constituti providing for a national assembly elected the people. Such restrictions, however, w thrown about the Duma that it could acco plish little in the way of direct legislation. T czar reserved the power to dissolve it at w a power which he promptly exercised wh ever the assembly acted contrary to the wis of the bureaucracy. The first Duma met M 10, 1906. It recommended universal suffra the abolishing of the Council of the Emp and a reform in the land laws. The Duma w dissolved July 22. While successive Dum were unable to enact legislation of importan the influence of this great national assem continued to increase throughout the Emp and the oppressive measures of the bureaucr met with more strenuous opposition from y

RUSSIA

Russian Soldier

The Tolstoi Home

Southern Siberian Travel

Petroleum Wells, Baku

Saint Isaac's Cathedral, Petrograd

A Village Scene

Peasant Family and Team

A Peasant Type

to year. Democracy was increasing and bureaucracy was decreasing. Matters had almost reached a crisis when all factions were united by the entrance of Russia into the great European war. (For Russia's part in the war, see WAR OF THE NATIONS.)

The Revolution of 1917. On Monday, March 12, 1917, Michael Rodzianko, president of the Duma, telegraphed the czar, "The hour has struck; the will of the people must prevail." The most remarkable revolution of modern times, if not of history, was on. Within the next four days the czar was compelled to abdicate, the Ministers connected with the old régime were deposed, and some of them were imprisoned, and the government of all Russia came under the control of the Duma and a responsible Ministry. All this was accomplished with so little loss of life that the movement was styled "the bloodless revolution."

While the revolution came with the suddenness of a shock, it was the climax of many years of preparation characterized chiefly by the evolution of democracy. Possibly the most powerful influence in this evolution was the zemstvo. Strange as it may seem, the war brought to the people the fruition of their many years of waiting and struggle. In brief, the immediate steps leading to the revolution were the following:

At the beginning of the war the Duma pleaded for the united effort of all factions and agencies in carrying it forward, but the plea was not favorably received by the bureaucracy, whose acts were characterized by the usual delays and peculations. The zemstvos, realizing that united effort must be made to maintain the troops at the front, formed the All-Russian Zemstvos Union, of which Prince Lvoff, afterwards Prime Minister of the new government, was president. The organization included all the zemstvos of the Empire, and was a powerful factor in uniting the people in a common cause. The Municipal Union, the War Industry Committees and coöperative societies all joined with the Zemstvos Union in working for the success of the army. Up to October, 1916, these organizations had established more than 3,000 military hospitals; had furnished food for 300,000 laborers engaged behind the trenches; had provided fifty hospital trains for the transportation of sick and wounded soldiers; had supplied the armies in the field with 3,000,000 tents and more than 35,000,000 articles of clothing, besides contributing in many other ways to the comfort and support of the troops. As the war progressed these organizations increased in extent and influence. In other words, the war showed the Russian people what they could do and gave them much-needed confidence in themselves and in their zemstvos.

When the great Russian drive of 1915 was followed by the retirement of the army from the territory it had conquered, the people began to inquire into the causes. The influence of the czarina (a German princess) in the councils of the nation was looked upon unfavorably. Investigations showed that the Russian forces were not compelled to retire because there was not a sufficient supply of ammunition, as had been alleged, but because that ammunition and other supplies had been withheld by orders of the bureaucracy. Further investigation showed beyond doubt that the ruling faction in the Ministry was in sympathy with Germany, and that some of these Ministers were traitors. In 1917 Professor Milyukov in the Duma accused Prime Minister Stürmer of being a traitor to his country. The Minister was removed, but the czar issued a ukase suspending the Duma. Instead of obeying the ukase, the Duma compelled the czar to abdicate.

ALEXANDER KERENSKY

The leaders of every political faction in Russia except the extreme anarchists proclaimed Kerensky the only man among the nation's millions who was strong enough to cope with the perilous political and military situation.

Meantime the army had been recruited from the ranks of the common people and realised its dependence upon the people for its support. Consequently the army was ready to support the revolution, and without its support the movement could not have succeeded. Nicholas II abdicated in favor of his brother, the Grand Duke Michael, but the latter wisely announced that he would not ascend the throne unless he was elected to the position by the people. The people favored a republic, and the Grand Duke retired to obscurity.

The formation of a new and stable government was an extremely difficult undertaking. At first it was decided to intrust the chief power to the executive committee of the Duma and a Council, or Cabinet, of Ministers, and on March 15 the new Cabinet was announced. It was headed by Prince George E. Lvoff. At this time also was formed what was destined to be the most influential governing body in the country—the Petrograd Council of Workmen's and Soldiers' Delegates, and the Peasants' Delegates of all Russia. The first Cabinet did not long survive because it was not a truly representative body. Russia is overwhelmingly Socialistic in sentiment, and this Cabinet had only one Socialist member—Alexander F. Kerensky. In the second Cabinet there were six Socialist leaders, and the most able of these proved to be Kerensky, who was made Minister of War and Marine.

The difficulties that confronted the provisional government at this juncture were almost insurmountable. The country was flooded with agents in the employ of the German government, who conducted an active propaganda for a separate peace; and the extreme radicals among the Russians, who are to all intents and purposes anarchists, were also clamoring for peace. Practically all of the forces standing for stable and orderly government favored a continuance of the war, and the Council of Delegates voted overwhelmingly for its vigorous prosecution. The personality of Kerensky proved at this crisis to be the dominant feature of the situation. He departed for the battle front and inspired the armies to begin an offensive movement in the Austrian crownland of Galicia. At first this movement was a brilliant success, but it lapsed into a failure because of disintegration "back home."

In July serious rioting occurred in the streets of Petrograd, which took the form of an uprising against the provisional government. It was supported partly by the extreme radical faction and partly by the Pro-German propagandists. What was far more serious, however, was a collapse of the military forces in Galicia. In many cases discipline broke down entirely, and triumphant advance was turned into a disastrous retreat—in some sections into a rout. Loyal units were compelled to fall back because other units refused to obey orders, and in a short time the German-Austrian forces penetrated across the Russian frontier.

At this supreme crisis the country again looked to Kerensky. A new Cabinet was formed with the great leader at its head, and a vigorous attempt was made to restore order. The executive committees of the soldiers, workmen and peasants voted to give Premier Kerensky the full powers of dictator, and he announced a rule of "blood and iron," this being the only policy that could save Russia. On the battle front the death penalty for desertion and insubordination (banished after the downfall of the czar) was restored. In September a counter-revolution, headed by General Korniloff, which threatened the life of the provisional government, failed because of the loyalty of his troops. On September 16 a republic was declared by Premier Kerensky and his associates.

In a Hundred Days. In somewhat over three months revolutionary Russia, marching towards stability and reconstruction, accomplished greater reforms than had been forced from the czars in a hundred years. Towns received local self-government; universal and equal suffrage was established, women being given the ballot on the same terms as the men; severe restrictions on the peasants were removed; the village commune was made a unit of local administration; elementary education was reformed; local courts were raised to a higher level; equitable forms of taxation were decreed; the state Church was made democratic by permitting the people to elect their own priests and higher prelates. These are some of the things which explain why the peasants and workingmen in the cities repose confidence in the new government.

W.F.R.

Consult Goodrich's *Russia in Europe and Asia;* Alexinsky's *Modern Russia;* Graham's *Russia and the World.*

Related Subjects. The following articles in these volumes will be of interest in connection with a study of Russia:

CITIES

Archangel
Astrakhan
Baku
Batum
Ekaterina
Helsingfors
Kazan
Kharkov
Kiev
Kishinev
Kovno
Kronstadt
Libau
Lodz
Minsk
Moscow
Nizhni Novgorod
Odessa
Orenburg
Petrograd
Reval
Riga
Saratov
Sebastopol
Tiflis
Vilna
Vladivostok
Warsaw

HISTORY

Austerlitz
Berlin, Congress of
Crimea, subhead *Crimean War*
Holy Alliance
Nihilists and Nihilism
Poland, subhead *History*

OUTLINE AND QUESTIONS ON RUSSIA

(Outline and questions refer, unless otherwise stated, to European Russia only.)

Outline

I. Location

(1) Of entire country, European and Asiatic
(2) Of European Russia, or Russia proper
  (a) Latitude (see map of Europe, following page 2092)
  (b) Longitude
  (c) Relation to other European nations
  (d) Advantages and disadvantages of its situation
  (e) Boundaries

II. Size

(1) Greatest east and west extent—1,850 miles
(2) Greatest north and south extent—2,250 miles
(3) Area

III. Surface Features

(1) Part of great plain of Europe
  (a) Greatest height 1,400 feet
  (b) Valdai Hills
  (c) Heights of the Volga
  (d) Caspian Sea basin
(2) Ural Mountains
(3) Caucasus Mountains

IV. Drainage

(1) Rivers
  (a) Arctic system
  (b) Baltic Sea system
  (c) Black Sea system
  (d) Caspian Sea system
    1. Mother Volga
(2) Lakes
  (a) Ladoga
  (b) Onega

V. Climate

(1) Differences in temperature due to latitude very gradual
(2) Effect of absence of lofty mountain ranges
(3) Continental climate
(4) Rainfall
(5) Length of days

VI. Plant and Animal Life

(1) Arctic zone of vegetation
(2) Evergreen forest belt
(3) Hardwood forest belt
(4) The steppes
(5) Fur-bearing animals
(6) Smaller animals
(7) Birds

VII. The People

(1) Races
(2) Classes of society
(3) Characteristic traits
(4) Education
(5) Religion

VIII. Resources and Industries

(1) Mining
  (a) Of iron and coal
  (b) Importance of platinum and manganese
  (c) Oil
  (d) Other minerals
(2) Fishing
(3) Agriculture
  (a) Chief occupation
  (b) System of landholding
  (c) Primitive methods
  (d) Chief crops
(4) Manufacturing
  (a) Effect of protective tariff
  (b) Absence of factory system
  (c) Chief articles manufactured

IX. Commerce and Transportation

(1) Russia as connecting link between Europe and Asia
(2) Effect of lack of transportation facilities
(3) Water transportation
(4) Railway mileage
(5) Roads

X. Government

(1) Historic phases
  (a) Autocracy
  (b) Establishment of Duma
(2) Government since revolution of 1917
(3) Local administration

XI. History

(1) Early years
(2) Establishment of modern Russia
(3) The Napoleonic period
(4) Continued autocracy
(5) Abolition of serfdom
(6) Russo-Turkish War
(7) Recent growth
(8) Russo-Japanese War
(9) Russia and the War of the Nations
(10) The revolution of 1917

Questions

Where is the largest area below sea level in the world? How much below sea level is it, on the average?

How does the heavy snowfall benefit Russia?

How many and what countries export more wheat than does Russia? Where is Russia's great wheat-producing region?

If the United States had the same railway mileage in comparison with its area as Russia has, how many miles of railway would it have?

What were some of the obstacles which the builders of Saint Petersburg (Petrograd) had to overcome? About how many people died during the first year of construction?

By whom and to whom was the message, "The hour has struck; the will of the people must prevail" sent, and what effect did it have?

Of what great physical region of Europe does Russia form a part?

How do you account for the fact that the climate of Russia varies so gradually throughout the great north-and-south extent of the country?

How much does the mileage of navigable rivers and canals exceed the railway mileage of the country?

What are the zemstvos, and what part do they take in the government?

When did the first legislative assembly of Russia meet? What was it called? What limitations were placed upon its power?

What three "vital elements," claimed as inherent rights by every democratic people in the world, have always been denied to the Russian people?

How does Russia as a whole, in Europe and Asia together, compare in area with the continent of Europe?

Who are the Cossacks, and what are their dominant characteristics?

How does the number of Jews in Russia compare with the number in other countries? Can you see any geographic reason to account for this?

What is the "mother" river of Russia? How does this stream rank as to size among the rivers of Europe?

Why should Russia have larger rivers than any other country of Europe?

What distinction as to size has Russia's largest lake among the lakes of the continent? How does it compare in area with the largest North American lake?

How long is the longest summer day in the capital of Russia?

What are the "steppes," and how has the advance of civilization changed their appearance?

What valuable product besides timber do the great forests of Russia furnish?

How does the country rank in its ouput of the heaviest and most valuable of the ordinary metals?

Why might Russia be supposed to have a better equipped cavalry than any other country of Europe?

What tendency toward change is observable in the system of land tenure?

How many countries have a greater forest area than has Russia? How is a lack of appreciation of the value of forests shown?

How do methods of manufacture differ from those employed in most other countries of Europe?

How has Russia's geographic position made the country of importance commercially?

Who was the "father of modern Russia," and why did he deserve the name?

Who were the serfs, and when and by whom were they liberated?

Romanoff
Russo-Japanese War
Russo-Turkish Wars
Vienna, Congress of

The following biographies also contain much historical matter:

Alexander I, II and III
Catharine I and II
Ivan III and IV
Kuropatkin, Alexei Nikolayevitch
Mazeppa, Ivan Stefanovitch
Nicholas I
Nicholas II
Paul I
Peter I
Plehve, W. K. von
Witte, Sergei Yulievitch

LAKES

Ladoga
Onega

LEADING PRODUCTS

Barley
Caviar
Fish
Flax
Horse
Lumber
Manganese
Platinum
Rye
Sturgeon
Wheat

MOUNTAINS

Caucasus, subhead
Caucasus Mountains
Ural Mountains
Valdai Hills

PROVINCES AND DEPENDENCIES

Bessarabia
Bokhara
Caucasus
Circassia
Crimea
Finland
Georgia
Poland
Siberia

RIVERS

Dnieper
Dniester
Don
Neva
Ural
Vistula
Volga

UNCLASSIFIED

Cossacks
Kremlin
Ruthenians
Steppes

RUS'SO-JAPANESE, *jap an cez'*, **WAR,** a struggle lasting from February, 1904, until September, 1905, through which Japan established its position among the nations as a first-class power, and became the dominant power in the Far East.

Underlying Causes. In 1895 Japan concluded a war with China (see CHINESE-JAPANESE WAR) in which the former country, by virtue of a complete victory, won the island of Formosa and the peninsula of Liao-tung (including Port Arthur). Russia, France and Germany, however, interfered, and forced Japan to cede Liao-tung back to China. Exhausted by the struggle, Japan was helpless to resist, but during the next decade the nation put forth every effort to prepare for the inevitable struggle with Russia, whose supremacy in Asia threatened the very existence of the island empire.

Russia owned Siberia, had obtained possession of the island of Sakhalin (see colored map accompanying the article ASIA), and had built a railroad joining Petrograd (then Saint Petersburg), on the west coast of Europe, with Vladivostok, on the east coast of Siberia (see TRANS-SIBERIAN RAILWAY). Moreover, after the clo of the Chinese-Japanese War, Russia leased t Liao-tung peninsula from China and built branch of the Trans-Siberian Railway throu Manchuria to Port Arthur. In 1900 control Manchuria was obtained. A lack of harbo free from ice the year round was the one gre obstacle to Russia's commercial expansion, a when the government began to make plans extend Russian influence in Korea, a land good harbors, Japan felt called upon to act.

The reasons are not hard to find. The sho of the island Empire was almost within gunsh of the Korean coast, and Russia's occupati of it would place Japan entirely at the forme mercy. In addition, Japan owned all of t railroads of Korea, and had tens of thousan of settlers there, as well as an enormous co trade with this unprogressive, undeveloped cou try. Yet no one dreamed that this little Ea ern Empire would dare risk annihilation at t hands of a great European country like Russ For more than five months the Japanese go ernment carried on negotiations with Russia an attempt to make a peaceful settlement. T Japanese asked that the independence of Kor and Manchuria should be respected and th both countries should be open to foreign s tlement and trade. When Japan realized t futility of these negotiations, war was declar on February 10, 1904.

Resources of Combatants. The opening hostilities found Russia not wholly prepar The guards and patrols of the Manchuri railways and the two garrisons of Vladivost and Port Arthur numbered about 80,000 m in all. Japan had a trained army of 200,(men. But behind Russia's army there were li itless men and limitless wealth; behind Japa army there was a second army of 200,000 m of the older classes and nothing more. Russi plan, therefore, was to avoid any active enga ments until reënforcements had come from t West; Japan's was to attack immediately.

Japan Opens Fire. On February 8, two da before the formal declaration of war, the Jap nese fleet under Vice-Admiral Togo swept do on the Russian Pacific squadron, drove it in the harbor at Port Arthur, laid mines in t entrance and succeeded in blowing up two the largest of the Russian vessels which w tured forth. After this defeat the Russian fl lay passive in the harbor for months. Jap while maintaining the blockade of the port, w able to withdraw enough ships to land t

armies, one in Korea and one on the Liao-tung peninsula. While one force, under Kuroki, engaged Kuropatkin's troops in the north, the other army, with Oku in command, prepared to attack Port Arthur.

The first land battle was fought along the Yalu, the river which divides Korea and Manchuria. It lasted for five days and resulted in a decisive victory for the Japanese. During the four-months' campaign which followed, the Russians knew only one victory, the repulse of the Japanese at Tashichiao, in the west. Under its supreme commander, Marshal Oyama, the Japanese army moved north in a great semicircle, forcing the Russians back and hemming them in until at Liao-yang the campaign culminated in a furious battle in which the Russians were forced to retreat to Mukden.

The Siege of Port Arthur. The first move of the southern army was to occupy Nanshan Hill on the narrowest part of the Liao-tung peninsula, a position of enormous strength. This brilliant victory cut Port Arthur off from any chance of reënforcements from the north. The siege of Port Arthur, which followed the capture of Nanshan, is one of the remarkable military achievements of modern times. The Russians, by intrenching themselves among the rocks and on the steep hillsides, held out for two months before they were forced to withdraw inside the ring of forts surrounding the city. The Japanese, under Nogi, first attempted to take these fortifications by storm, but after seven days of fighting and bombarding, in which they lost 25,000 men, they realized the futility of this method of attack. In the five months following they literally tunneled their way into the very heart of the fortress, advancing by means of trenches, by undermining outposts, and by blowing up fortifications. These engineering operations served merely as a means of approach to the enemy and had to be followed up, in every case, by the fiercest kind of close fighting. On the second of January, 1905, Stoessel, the Russian commander, surrendered the city.

The Last Battles. In the meantime the second Japanese army, in the greatest land maneuver of modern times prior to the War of the Nations, forced the retreat of the Russian army under Kuropatkin towards the north. The Battle of Mukden in March, 1905, for which Japan had to put forth a supreme effort, resulted in the complete rout of the Russian army. The Japanese navy, under Admiral Togo, was also proving its supremacy. In the Battle of the Sea of Japan, the Russian Port Arthur squadron was destroyed and the Vladivostok squadron met with the same fate shortly afterwards. On the 27th of May the Baltic fleet was intercepted near Tsushima, on its way to Vladivostok, and practically every ship was captured and sunk.

The Treaty of Portsmouth. The war drifted on in a desultory fashion during the late spring and early summer, but both countries had had enough. Russia could import men at the rate of 30,000 a month over the Trans-Siberian Railway and reorganize its army, but its soldiers had no heart for further fighting. Japan was exhausted, having paid a terrific price both in men and money for its victory. So when Theodore Roosevelt, the President of the United States and an ardent advocate of international peace, proposed peace negotiations, both countries were ready to listen. By the terms of the treaty, which was signed at Portsmouth, N. H., on September 5, 1905, Russia ceded to Japan the southern half of Sakhalin, surrendered its lease of Port Arthur and adjacent territory, agreed to withdraw its troops from Manchuria, and to recognize Japan's sphere of influence in Korea. B.M.W.

Consult Baring's *With the Russians in Manchuria;* Kuropatkin's *The Russian Army and the Japanese War.*

RUS'SO-TURK'ISH WARS. The many wars between Russia and Turkey cover a period of more than 200 years, from the beginning of the eighteenth century down to the War of the Nations, in which Turkey allied itself with Germany and Austria against Russia, England, France, Belgium and Italy (see WAR OF THE NATIONS). The main cause for this period of struggle has been Turkey's opposition to the eastward expansion of Russia into its territory. The antagonism inevitable between people of different religions—Christian Russians and Mohammedan Turks—has been a contributory cause, and the border uprisings of the half-civilized, warlike tribes on the boundaries of both countries have always furnished an excuse for invasion.

Wars of the Eighteenth Century. Peter the Great, inspired by the thought of waging war against the infidels for the cause of Christianity, and further actuated by his ambition to make Russia a great naval power, attacked and captured Azov, a Turkish port that had access to the Black Sea. The wars of his reign lasted from 1696 to 1711 and marked the beginning of the long enmity between the two countries. From that time on Russia and Turkey regarded each other as foes, for the interests of each were

a menace to the other. While Turkey grew weaker and weaker, Russia continued to develop, and the Moslem nation would probably have been absorbed if Russia had not been held in check by the other European nations, who were jealous of Russia's growing power.

Little is remembered to-day of the later wars of the eighteenth century except that they were the occasion of daring exploits on the part of Suvorov, a celebrated Russian field-marshal who won many spectacular victories over the Turks. In the war of 1736-1739 Austria was allied with Russia, and together they succeeded in freeing the Tartars in the south from allegiance to Turkey. By the war of 1787-1792 the boundaries of Russia were extended to the Dniester River.

Wars of the Nineteenth Century. There were four important wars during the nineteenth century. The first, lasting from 1806 to 1812, resulted in an extension of Russia's boundaries across the Dniester and on to the River Pruth, which gave it the province of Bessarabia. By the second, the war of 1827-1829, which ended with the Treaty of Adrianople, Russia forced Turkey to recognize the independence of Greece. The third was the Crimean War (1854-1856), in which Turkey fought with England, France and Sardinia against Russia, and got back a part of Bessarabia (see CRIMEA, subhead *Crimean War*).

The last war of the century is the one usually referred to as the Russo-Turkish War (1877-1878). Russia had never wavered in its determination to regain the territory and influence lost in the Crimean War, and in 1877 an excuse was found for attack in the massacres of the Christian peasants in Bulgaria. The most interesting feature of the war is that Russia fought and won by modern methods. The value of "spade work," improvised trenches and fortifications for securing invisibility, was clearly demonstrated by the Russian forces. These methods won the siege of Plevna, the turning point of the war, when the heroic army of Osman, the Turkish general, was captured. With the exception of this one siege and the rout of the Turkish army at Philippopolis, there were no decisive battles. It was an endurance test in which Russia succeeded in wearing out the Turks. The Treaty of San Stefano, which ended the war, was very favorable to Russia, but three months later England, backed by the other European powers, intervened and succeeded in modifying the terms of the treaty. For details, see BERLIN, CONGRESS OF. A.C.

RUST, in the arts, a brownish-red substance that forms on the surface of iron or steel when they are exposed to a damp atmosphere. The term without modification means *iron rust,* which is a compound of oxygen and iron, commonly known as the red oxide of iron. Rust is formed by the union of the oxygen of the air with the iron, and moisture is an important agent in producing the change. When rust is formed the surface of the metal is corroded, so that a polished surface is made rough. Rust not only corrodes the surface, but it weakens the metal. Long exposure to air and moisture, for instance, will cause nails to rust off, and rust frequently eats holes through sheet iron. Articles of iron and steel should be kept in dry places, or their surfaces should be coated with some substance that will resist the action of oxygen. Polished tools are easily protected by wiping them over with a cloth soaked in oil. See OXYGEN.

How to Remove Rust. Rust may be removed from iron and steel by scrubbing with water, or by the use of the flour of emery or any other polishing powder, provided the rust has not been forming for too long a time. A thick coat of rust requires the use of an emery wheel, a grindstone or a file for its removal. The brownish-yellow spots of iron rust formed on linen may be removed by soaking the fabric in a weak solution of oxalic acid for a short time and then thoroughly washing it. A strong solution of this acid will weaken and may destroy the fabric. Sometimes lemon juice is used with success.

RUSTS, in botany, various forms of fungus that grow upon other plants (see FUNGI). The name was applied because the growth bears a close resemblance to iron rust. There are numerous varieties of rust. Black rusts are dark, and sometimes almost black. Rusts grow upon both wild and cultivated plants; those that attack grains cause a great deal of damage. It is estimated that the red rust on wheat causes the farmers of the continent a loss of from $10,000,000 to $15,000,000 annually, and in addition to this it causes more or less damage to oats and barley. The damage from rust in the great grain-growing regions of Canada is relatively much less than in the United States.

Rust consists of a minute fungus that fastens itself on the stems and leaves of the plants, appearing at first as tiny black or brown dots. The fungi multiply rapidly, drawing their nourishment from the plant and sapping its vitality. Wheat affected by rust produces a small yield,

and the grain is of inferior quality. Rust is propagated by minute spores. These spores survive the winter and begin to grow in the spring, but unless they are carried to a barberry bush or some other plant from which they can derive nourishment they soon die. A field infested with rust one season seldom escapes the next, and the only successful method of preventing a second disaster consists in ridding the field of the spores.

After the harvest, burn the stubble and all infested straw. If this straw is used for litter, it will be carried in the manure to other fields and infest them with rust. If possible, plant the field with some other crop the following season. A tillage crop, such as corn or potatoes, is best. Hard, red wheat resists rust better than the soft, white varieties and a change from a soft to a hard variety will often prevent the spread of the disease. Never sow wheat on stubble land where rust has been abundant, for the ground is full of spores which will find lodgment in the new crop.

Consult Massee's *Mildews, Rusts and Smuts.*

RUTH, *rooth,* a book of the Old Testament, an exquisite narrative of Hebrew rural life "at the time when the judges judged." Ruth is also the name of the heroine of the story. She was a Moabitish damsel, the widow of an Israelite whose family had taken refuge from famine in Moab. Ruth's affection for Naomi, her husband's mother, and her loyalty to the family into which she had married, are revealed in her answer to Naomi's plea that she return to her own home:

> Intreat me not to leave thee,
> Or to return from following after thee:
> For whither thou goest, I will go;
> And where thou lodgest, I will lodge:
> Thy people shall be my people,
> And thy God my God:
> Where thou diest, will I die,
> And there will I be buried:
> The Lord do so to me, and more also,
> If aught but death part me and thee.

Then the two women journeyed to the land of Judah. Ruth's fine qualities came to the notice of Boaz, a wealthy landowner of Bethlehem, in whose fields she gleaned. As a kinsman of Naomi, he showed her many acts of courtesy and later made her his wife. Thus the alien maid became the grandmother of King David and direct ancestress in the Messianic line.

RUTHENIANS, *ru the'ni anz,* or **LITTLE RUSSIANS,** the name given the Slav inhabitants of Southern Russia and Austria on both sides of the Carpathian Mountains. There are in all about 20,000,000, and one-fourth of them reside in Galicia. The majority are characterized by short stature, chestnut hair and brown eyes. They speak the Russian language and most of them belong to the United Greek Church. Previous to the seventeenth century they were an independent people. They were then conquered by the Lithuanians and later by the Poles, and their territory was annexed to Poland. When Poland was divided they came under the control of Russia and Austria. Most of them are agriculturists, but they adhere to old methods and employ implements long since discarded by more progressive peoples. Lemberg is their chief city. See GALICIA.

RUTH'ERFORD, ALEXANDER CAMERON (1855-), a Canadian barrister and statesman, first premier of Alberta, from 1905 to 1911. He was born at Osgoode, Carleton County, Ontario, attended the Metcalfe High School and Woodstock College, and was graduated from McGill University. After he was called to the bar in 1885, he practiced law at Ottawa for ten years, removing to Alberta. There he became active in the Liberal party, and was for several years secretary-treasurer of the town of Strathcona and of the Strathcona school district. In 1902 he was elected to the Northwest assembly, and during its last sessions was deputy speaker. In 1905, on the organization of the province of Alberta, Rutherford formed the first cabinet, he himself assuming the portfolios of the treasury and education in addition to the premiership. During the Rutherford administration the entire governmental machinery was set in motion, the public school and judicial system were established, a government-owned telephone system was introduced, and liberal aid extended to railways and other industrial enterprises. The downfall of the Rutherford ministry was caused in 1911 by the proposal to build the Alberta and Great Waterways Railway under terms which were criticized as disadvantageous to the public interest. After his resignation from the premiership Rutherford continued to serve in the assembly. His successor as premier was Arthur L. Sifton (which see).

RUTILE, *roo'til,* a beautiful reddish or yellowish-red mineral that sometimes occurs in transparent quartz, in the form of hairlike crystals. It imparts to the quartz the appearance of having colored threads extended through it. Rutile also occurs in larger masses in some of the older rocks in Sweden, in the Ural Moun-

tains and in the United States. It is employed for imparting a yellow color to glass and porcelain, and some of the finest specimens are polished and set, forming beautiful gems.

RUT'LAND, VT., called *The Marble City,* is the center of the greatest marble industry in the United States. It is the county seat of Rutland County, and is situated in the central part of the state, on Otter Creek. Burlington is sixty-eight miles northwest, Bennington is fifty-seven miles southwest, Boston is 168 miles southeast and Montreal is 168 miles northwest. The Rutland, the Delaware & Hudson and the Clarendon & Pittsford railways enter the city, and electric lines connect with adjacent towns west. In population, Rutland ranks next to Burlington, the metropolis of the state. The population increased from 13,546 in 1910 to 14,831 in 1916 (Federal estimate). The area exceeds eight square miles.

Rutland lies near some of the loftiest peaks of the Green Mountains, famed for their forest-clad slopes, and in a fertile valley noted for its maple sugar, maple syrup, honey and dairy products. More important than these sources of prosperity are the great marble quarries of the vicinity. The weight of marble quarried annually in the county is estimated at 90,000 tons, exclusive of waste. Three-fourths of the marble-working machinery used in the United States is made at Rutland. Besides, the city has large plants for making scales, utensils used in the maple sugar industry, and stone-working machinery. Almost all kinds of foundry and machine-shop products are made here, and paper and fire clay are also produced. The noteworthy architectural features of Rutland are Memorial Hall, built of marble, a Federal building which cost $107,000, the county courthouse, the city hall, the City Hospital and the House of Correction. In addition to the public and parochial schools there are Saint Joseph's Academy, the public library and the H. H. Baxter Memorial Library.

The first settlement was made in 1770, and for many years it was claimed by both New Hampshire and New York. In 1772 the village was chartered as Socialborough, but the name was not retained. In 1781 Rutland became the county seat, and from 1784 until 1804 it was one of the two capitals of Vermont. In 1892 it was chartered as a city. From it, in 1886, the towns of Proctor and West Rutland were set off under separate governments.

RUTLEDGE, *rut'lej,* JOHN (1739-1800), the first state governor of South Carolina and one of the great figures of Revolutionary days. He was born in Charleston, S. C. From the very beginning of the trouble with England he was an influential leader on the side of the colonies, and was one of the first to urge actual independence. He represented South Carolina in the Stamp Act Congress and again in the first Continental Congress, and when, in 1774, the colony declared itself an independent state, Rutledge served on the committee which drafted its constitution and became its first executive, with the title of president.

It was largely through his foresight and patriotic ardor that Charleston was so fortified as to be able to repel the first British attack in 1775. When the English captured the city in 1780, after a two months' siege, Governor Rutledge joined the army of Nathanael Greene in North Carolina. At the close of the war he again served in Congress, being a member of the convention which framed the Constitution of the United States. He was successively Associate Justice of the national Supreme Court, chief justice of the supreme court of South Carolina, and Chief Justice of the United States Supreme Court. In the latter capacity he had presided over only one term when his reason failed, and the Senate never confirmed his appointment.

RUYSDAEL, or **RUISDAEL,** *rois'dahl,* JACOB (about 1628-1682), Holland's foremost painter of landscape. Though his canvases often give a suggestion of melancholy, because of his fondness for painting clouded skies, dark masses of leaves and other somber aspects of nature, his pictures have a charm that comes from poetic and sympathetic treatment. In all of his work the technique is admirable, both in the rendering of detail and in the execution of broad effects, and he always painted truthfully what he saw. Ruysdael was born at Haarlem, where he had as a teacher his uncle, Salomon Ruysdael. His best work was accomplished in the period between 1660 and 1675, in the city of Amsterdam. The last years of his life were darkened by poverty and illness, and he died in an almshouse.

Ruysdael painted with equal facility quiet, flat landscapes, stormy seas and mountainous scenery, though his favorite subjects were the quiet scenes of his native Holland. Some of the best examples of his work are *View of Haarlem* and *Agitated Sea* (Berlin Museum); *Jewish Cemetery* (Dresden Gallery); *Landscape with Ruins* (National Gallery, London); *Storm at Sea* (Louvre). The Metropolitan Museum in

ırk possesses *Cottage Under Trees, Forım* and *Wheatfields,* and there are many nvases in private collections in America.

ER, *roi'ter,* or *ri'ter,* MICHAEL ADRIN DE (1607-1676), a Dutch admiral who ith the greatest of Holland's fighting

He was born at Flushing and was a om his boyhood. In 1641, having risen ank of rear admiral, Ruyter took charge quadron sent to help the Portuguese the Spanish; a few years later he was ully fighting against the Barbary pirates Mediterranean. In 1652, when Tromp great victory over Blake in the English l, he had Ruyter as his assistant. The as given chief command of the Dutch er the death of Tromp, and though he always successful, he was a hard foe to . He died in 1676 from the effects of received in a battle with the French.

I, ABRAM JOSEPH (1839-1886), a Roman priest and American poet who served lain in the Confederate army through- War of Secession. He was born in Nor-., August 15, 1839, and had been or- only a short time when the war broke is first work, after peace was declared, New Orleans, editing *The Star,* a re- weekly paper, work which he combined duties as a priest. He left New Or- go to Atlanta, Ga., where he founded ducted a political and religious weekly *he Banner of the South.* He was later e of a parish in Mobile, Ala., and from went North to lecture and to supervise lishing of a volume of his poems. *The red Banner, The Lost Cause* and *The Erin* were three of his best poems.

I, PATRICK JOHN (1831-1911), an Amerinan Cath- late, arch- of Phila- He was Thurles, Tippe- Ireland, at Car- lege with . of work- he United and emi- to Saint

ARCHBISHOP RYAN

t the age of twenty-two. In that city ordained priest and made professor of literature at Carondelet Theological y.

After serving for a time as rector of the Saint Louis Cathedral he was transferred to the Church of Saint John the Evangelist, and in 1872 was consecrated bishop of Triconia, and made coadjutor to the archbishop of Saint Louis. Eleven years later he was promoted to the archbishopric, and in the next year was transferred to the important archdiocese of Philadelphia, one of the most important in the United States, having at the time a population of nearly half a million of Roman Catholics. He was particularly distinguished as a preacher, and in 1868 was invited by Pope Pius IX to deliver the Lenten lectures in Rome. In 1902 President Roosevelt made him a member of the Indian Commission. Archbishop Ryan's published works are *What Catholics Do Not Believe* and *Causes of Modern Religious Skepticism.*

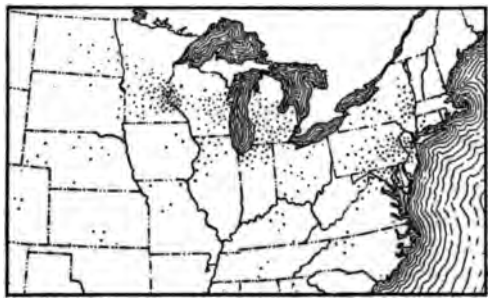
RYE, *ri,* a grain closely resembling wheat and barley, raised in the cool regions of Europe, Asia and America. Russia is the leading rye-producing country, its crop averaging about 880,000,000 bushels; Germany follows, with

THE CHIEF RYE COUNTRIES

about 456,000,000 bushels. In the United States the crop amounts to about 44,000,000 bushels, and in Canada it is a little less than 2,500,000 bushels. Rye is the hardiest cereal known, and will succeed where other grains cannot be raised. Two varieties, the spring and the winter, are grown. The winter variety is sown in the fall and harvested in June or early in July. The spring variety is raised chiefly for forage. Winter rye is successfully grown in Alaska, where it is a valuable crop.

Rye is adapted to light, sandy soils and does not thrive well on heavy damp soils. While it is not so valuable as wheat for food, its adaptability to a cool climate and a light soil makes it one of the most important food plants

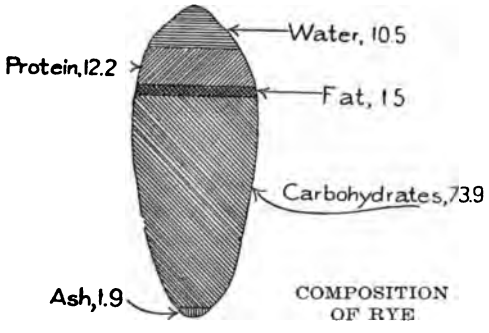
of Northern Europe. The grain is sown broadcast or in drills, like wheat, and from one and one-half to two bushels of seed per acre are required. Under favorable conditions the yield is from twenty to thirty bushels per acre. The price varies from fifty cents to eighty cents per



PRODUCTION IN THE UNITED STATES
Where the dots are most numerous on the map the yield is greatest.

bushel, according to supply and demand. In the United States fifty-six pounds of rye make a bushel.

Rye flour is obtained by a milling process similar to that used in the manufacture of wheat flour (see FLOUR). Three products—bran, shorts and flour—are obtained. The flour is made into the black bread so generally eaten by the people of Northern Europe. It is more compact and a little less nutritious than wheat bread. In the United States wheat and corn flour are mixed with rye flour in making rye bread, which is used to a limited extent. The



COMPOSITION OF RYE

chief use of rye in the United States is in the manufacture of malt and spirituous liquors, of which rye whisky is a good example. In Holland it is employed in the manufacture of Holland gin, and in Russia large quantities were formerly consumed in the production of kvass, a national beverage.

Rye is a good fodder for stock, and when used for this purpose the whole kernel is ground. It makes a good forage crop if fed before the heads form. It is sometimes u as a cover crop and for green manuring (FERTILIZER). The straw is long, smooth flexible. It is made into hats and mats, an employed for packing crockery and glassw in the manufacture of some grades of pa and for stuffing mattresses and horse coll In European countries where thatched roofs still common it is extensively employed a thatch, since it resists decay better than n other straws.

Rye is subject to a fungous disease ca ergot (which see).

RYE HOUSE PLOT, a scheme devised b few of the most radical members of the E lish Whig party in 1683, the purpose of wh was to waylay and assassinate Charles II his return from the Newmarket races. T deed was to be perpetrated at Rye Ho Farm, the country place of one of the c spirators; from this circumstance the plot tained its name. The house which the k occupied at Newmarket burned, and Cha was thus forced to leave eight days sooner th was expected, which frustrated the plans of would-be assassins. For supposed complic in this plot Lord William Russell and Algern Sidney were beheaded, though the evide against them was not sufficient to prove th guilt. Another alleged conspirator, the Earl Essex, committed suicide in the Tower.

RYERSON, *ri'er son*, EGERTON (1803-1882) Canadian educator and clergyman, founder Ontario's public school system and the forem Methodist of his time. Dr. Ryerson was born Charlotteville, Ont. He studied for the Me odist Episcopal ministry, and at the age of twenty-two began his career as a minister. After filling several pastorates, he helped to found in 1829, and became the first editor of, the *Christian Guardian,* the official organ of the Canadian Methodist Church. He then began take an active part in educational affairs, tained a charter in 1836 for Upper Can Academy (later Victoria University) at C bourg, and in 1841 was appointed its first pr cipal.

EGERTON RYERSON

Ryerson favored the establishment of de- national colleges, but he urged that they d be affiliated with a central provincial ution. This plan has been worked out in Jniversity of Toronto. In 1884 he was n superintendent of education for Upper da. This office he held until Confedera- when he assumed the same position for rovince of Ontario, the combined service ing thirty-two years. He drafted and pro- the passage of laws which established the iples of Ontario's school system, which een copied, to a greater or less degree, by ther provinces.

religious affairs Dr. Ryerson was equally e. In 1874 he was elected president of the General Conference of the Methodist ch in Canada; this office he held four . On several occasions he was delegate of anadian conference to conferences in Eng-

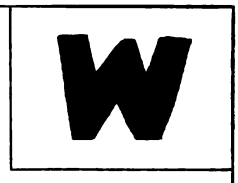
Neither religion nor education, however, l his interest in political affairs. He was ited Empire Loyalist by descent and a by sympathy, but he would not apply w Tory principles in education or religion. vored the secularization of the clergy re- s and opposed further efforts to confine government endowments of any kind to a particular denomination. Responsible government he opposed, because he feared that Canada might suffer from it in an extreme form.

Dr. Ryerson was an orator of distinction, and frequently spoke on the platform as well as in the pulpit. He was also a contributor to journals and wrote a number of books which are valuable sources in Canadian history. These are *Affairs of the Canadas; Report on Popular Education; Letters in Defense of Our School System; The Loyalists of America and Their Times;* and *The Story of My Life,* an autobiography.

RYSWICK, *ris'wik,* TREATY OF, a peace agreement made in 1697 at Ryswick, near The Hague, between Louis XIV of France and the coalition of European powers known as the Grand Alliance. It brought to a close a nine-years' war waged against Louis, whose ambitious designs menaced the independence of the nations of Europe. The various conquests made by both sides during the struggle were given up, and the power of Louis from that time began to wane. See FRANCE, subtitle *History of France;* LOUIS, subhead *Louis XIV;* WILLIAM III (England).

Ss

S is the nineteenth letter in the English alphabet. The Phoenician letter from which it was derived was shaped much like a capital *W*, and was called *shin*, which meant *tooth*. Doubtless it was intended to represent two teeth, though it looks like those of a saw rather than those of a human being. The Greeks turned the letter on its side, and called it *sigma*, and the Romans, when they adopted it, gradually dropped the lowest line and rounded it into the form of modern capital *S*.



The letter has had in all these languages about the same sound, though it is probable that in the Phoenician it had rather more of the *sh* value than is common to-day. In English, *s* has four sounds: the proper *s*, or "hissing" sound, as in *sit;* the *z*, or "buzzing" sound, as in *music;* the *sh* sound, as in *sure*, which is uncommon except before *i* in such words as *mansion;* and the *zh* sound, as in *decision*. *S* is also used with *h* in a very common digraph, or letter combination.

SABBATH, *sab'ath,* the rest day of the Jews, observed on the seventh day of the week. In ancient times it was a joyous, holy day on which the people ceased from toil, visited the sanctuary and offered a double number of sacrifices. The Sabbath was in existence from the earliest times, but was first ritualized by Moses, and the duty of its observance was made the subject of one of the Ten Commandments.

After the Babylonian exile, Sabbath observance became very rigid, and the Jews suffered many losses and indignities at the hands of their enemies rather than break the Sabbath laws. In the oral law, twenty-nine major and minor kinds of labors were forbidden. Bearing burdens, lighting fires and traveling more than a Sabbath day's journey (less than a mile) were not allowed. The attitude of Jesus in regard to these regulations is summarized in the statements—"It is lawful to do well on the Sabbath day," and "The Sabbath was made for man and not man for the Sabbath." Except in the Gospels, the Sabbath is not mentioned in the New Testament writings. There is reference, however, to the first day of the week (Sunday), observed in commemoration of the resurrection of Jesus. Observance of Sunday as a holy day has become practically universal in the Christian Church, though the Seventh-Day Adventists (which see) recognize Saturday as the Sabbath. See SUNDAY.

Consult Jastrow's *Hebrew and Babylonian Traditions.*

SABINE, *sa·been',* **RIVER,** a stream which rises in Northeastern Texas, flows southeast for 250 miles, and then south on the lower half of the boundary between Texas and Louisiana through Sabine Lake and Sabine Pass into the Gulf of Mexico. Its entire length is 500 miles. The Sabine Pass is a narrow channel with a muddy bar at its mouth, and though often dredged, it cannot be used by large steamers. Even small boats can ascend for only a short distance. Orange, Tex., a lumbering center, is the principal town on its banks, and Port Arthur is on the Texas shore of Sabine Lake.

SABINES, *sa'bines,* an ancient Italian people whose daughters were seized and carried off by the early Roman youths, while they were all being entertained at a great festival. According to the legend, after Romulus had built Rome he found that there were few women among the inhabitants, so he sent embassies to the neighboring cities to ask that his people

might take wives from among them. When his request was refused, he planned to invite all the surrounding people to an elaborate entertainment. In the midst of the games, the Romans violated the laws of hospitality by seizing the young women, but after the Sabines had been dissuaded from making war, the two nations were combined as one, the Sabines settling on Quirinal Hill.

SABLE, *sa'b'l,* a small mammal belonging to the fur-bearing group of animals, and having the most valuable pelt of them all. It is native to Siberia and is closely related to the North American *pine marten,* or *American sable,* as the latter is sometimes called (see illustration, page 3666). The sable is usually not over a foot and a half in length. Its fur is a lustrous dark brown, with grayish-yellow spots on the sides of the neck, and a single pelt of highest quality is worth about $200. Less expensive grades run to about $50. In European countries sable is used in the robes of sovereigns and state dignitaries; a coat of this fur owned by Nicholas II, former czar of Russia, is said to be worth $22,000. The animal is somewhat difficult to capture, and is caught in traps especially designed to prevent injury to the fur. The fur of the muskrat and that of the hare are dyed and sold as imitation sable. For habits of the animal see the article MARTEN. See, also, FUR AND FUR TRADE.

SABLE ISLAND, sometimes called the "Graveyard of the Atlantic," and known to early navigators as Santa Cruz, or "Holy Cross," is a low, sandy island about one hundred miles off the southern coast of Nova

LOCATION OF SABLE ISLAND

Scotia. It is on the northern lane of travel between Europe and America, and over 200 wrecks have occurred near the treacherous Cape Sable, which juts out into the Atlantic at the southern extremity of the island. Sable Island is crescent-shaped, about twenty miles long and one mile broad. The Canadian government has caused thousands of trees to be planted on the island to bind more solidly the shifting sandy soil. Before the trees were planted the shape of the island was continually being changed by the pounding of the Atlantic waves. The government also maintains there a life-saving station, wireless telegraph station and a lighthouse. Cranberries grow in large quantities, and the island supports a hardy breed of ponies.

SABOTAGE, *sab o tazh',* a comparatively new means adopted by certain classes of workmen in their labor struggles with employers. The word is of French derivation, and means *scamped work.* The practice of sabotage first meant rendering too little service for wages paid, doing poorly the work assigned, or using poor material where better quality was ordered, thus injuring the value and reputation of manufactured goods. Radicals and irresponsible men found such means were too slow in their effects, so to-day sabotage has reached the point in practice where it may be defined as malicious waste or destruction of property of an employer.

In the lumber industry, for instance, it may mean cutting logs shorter than the required length or sawing boards thinner than ordered; it may mean driving spikes into logs so saws will be ruined. In a machine shop it may mean putting sand or iron filings into oil cups or gearings, loosening bolts or purposely mislaying tools to cause delays. In building construction it may mean weak mixture of mortar or waste of material; in street paving, instability of foundation or poorly-prepared material. In any trade or occupation it may mean "laying down on the job"—working so slowly and accomplishing so little that the employer suffers loss.

It is not to the advantage of those who practice sabotage to destroy machinery or even to damage it very seriously, for such maliciousness may involve loss of wages after labor trouble is adjusted until repairs can be made. Everything which can irritate and embarrass the employer and diminish production is employed in secret; that some of the acts resorted to are criminal does not deter the guilty persons, for detection is difficult, and it is almost impossible to place responsibility.

Sabotage is severely condemned by all reputable labor unions; it is the weapon of the man without conscience; it lacks the element of fair play, and wherever employed it widens the breach between labor and capital.

One organization, known as the Industrial Workers of the World (the "I. W. W."), does not deny that on occasion it has advised sabotage. E.D.F.

SAC, *sak,* or **SAUK,** *sawk,* a warlike tribe of the Algonquian family, who were persistently hostile to early white settlers. Black Hawk (which see), their greatest chief, was one of the most famous Indians of American history. French explorers found the tribe in Northern Wisconsin, in the latter part of the seventeenth century. The Sacs and their kinsmen, the Foxes, who also lived in that region, were driven southward by the Ojibwa, and ultimately the two kindred tribes formed a confederacy. These Indians were gradually forced west of the Mississippi River, and the few remaining live in Kansas and Oklahoma. See Fox.

SACCHARIN, *sak'a rin,* a white, odorless powder, a compound of coal tar, which when pure is five hundred times sweeter than cane sugar. It was discovered in 1879 by Dr. Constantin Fahlberg, of Germany, and Ira Remsen, a noted American chemist, and was later patented in Europe and in the United States. The manufactured product often contains a large percentage of impurities which considerably lessen its sweetening power. It is sold usually in tablet form. Saccharin dissolves very little in cold water, somewhat more in hot, and is thoroughly soluble in alcohol. Although it is so much sweeter than sugar, it is not nearly equal to the latter in food value. However, because it does not ferment in the stomach it is often given to persons having diabetes, where sugar would be harmful. It is used chiefly in candy making, baking and preserving, and in the making of cordials and mineral waters.

SACHS, *zahks,* HANS (1494-1576), a German poet, the most famous of the mastersingers. He was born in Nuremberg, learned the trade of shoemaking, and spent several years traveling about the country as a journeyman shoemaker. He had received a good education and followed this with instruction in the art of the mastersingers, so that his songs, fables and dramas soon became famous. In 1516 he settled in Nuremberg, where he remained for the rest of his life. The doctrines of Luther interested him greatly, and he wrote in support of the Reformation, always contending for peace and moderation. The works of Sachs are not only better, but more numerous, than those of any other mastersinger. Altogether, including tales and fables in verse, dramas, hymns and songs, he left not fewer than 6,300 pieces. These show humor as well as sentiment, and though he had always some didactic purpose in mind, it is not unpleasantly apparent. See MASTERSINGERS.

SACKVILLE, a town in Westmoreland County, New Brunswick, in the southeastern part of the province. It is on the Tantramar River, about five miles from its mouth in Chignectò Bay, and on the main line of the Intercolonial Railway. It is also the terminus of the Intercolonial's Shediac branch, which connects with the Prince Edward Island ferry at Cape Tormentine. Moncton is thirty-eight miles northwest of Sackville by rail, Cape Tormentine is thirty-six miles northeast, and Truro is eighty-six miles southeast. Population in 1911, 2,039; in 1916, about 2,300.

Sackville is well known as the seat of Mount Allison University and Ladies' College. It is also a manufacturing center, having several large stove, harness and shoe factories. Less important are the carriage works, paper-box factory and woodworking plant. The town has a considerable trade in coal, lumber, molasses and sugar. The neighborhood supplies stone and lumber, especially spruce and some hard woods, and is also a fertile farming district. Sackville was incorporated as a town in 1903.

SACO RIVER, *saw'ko,* a river which rises in the White Mountains of New Hampshire, flows through Crawford Notch and southeast through Maine, emptying into the Atlantic by way of Saco Bay. It is a swift-flowing stream, about 105 miles in length, and has many beautiful rapids and falls. These render it useless for navigation, but furnish excellent water power. At the town of Saco, Me., there is a waterfall forty-two feet high, which provides power for several cotton and woolen mills and brick factories.

SACRAMENT, *sak'ra ment,* in the Christian Church, a solemn observance instituted for the spiritual benefit of the participants. In the Eastern and Roman Catholic Churches there are seven sacraments—Baptism, Confirmation, Holy Eucharist, Penance, Extreme Unction, Holy Orders and Matrimony. Most Protestant Churches recognize only two—Baptism and the Eucharist, or the Lord's Supper. Quakers reject all sacraments as unnecessary formalities. As to the meaning of the sacraments, Roman Catholics consider them effective, in themselves, for salvation. Most Protestant Churches regard them as visible signs of a covenant between God and the individual.

SACRAMENTO, *sak ra men'toh,* CAL., the state capital and the county seat of Sacramento

y, beautifully situated along the Sacra- River in the north-central part of the ninety miles northeast of San Francisco. erved by the Southern Pacific and West- ıcific railroads and by an extensive sys- f electric interurban lines. Its popula- ıcreased from 44,696 in 1910 to 66,895 al estimate) in 1916. Among this num- e Japanese, Chinese and Hindus. The f the city is about fourteen square miles. fine state capitol, completed in 1869 at of $2,500,000, stands in a park of thirty- ıcres in the center of the city. Plans being perfected in 1917 to enlarge the l grounds and erect other buildings to 3,000,000. The city has a Federal build- ected in 1894 at a cost of $500,000 and ed in 1912 at a cost of $150,000; a city ourthouse, Crocker Art Gallery, Y. M. building, the Foresters, Fruit Exchange orum buildings, Masonic, Elks' and Odd s' buildings, the Women's and Sutter and Travelers' and Sacramento hotels. arked area exceeds 1,000 acres, and in- Capitol Park, McKinley, South Side, aso and many smaller parks. The State ıltural Society conducts the annual state Sacramento. Educational and benevo- ıstitutions include the state library, one largest on the coast, the public and the ellows' libraries, Christian Brothers' Col- Howe's Academy, Saint Joseph's Academy, Marguerite Home and the Protestant Or- Asylum, and the Southern Pacific Rail- ınd county hospitals.

city is in one of the most productive ltural regions of the state, the Sacra- River Valley. The annual harvest of citrus and deciduous) and nuts in Sacra- County is worth approximately $2,500,- Establishments connected with the fruit ss are among the city's most important rial plants. The value of manufactured cts is about $14,000,000 a year, represent- ıe output of canneries, flour mills, grist- foundries and machine shops, slaughtering ıeat-packing establishments, and manufac- of harness and saddles, carriages, furni- soap and other commodities. Both rail- have shops here; the Southern Pacific employ 3,500 men.

er obtaining a grant of land from the an government, Captain John A. Sutter, a few trappers and Indians, made a set- ıt on the site of Sacramento in 1839. ounder called it *New Helvetia*, but it was popularly known as *Sutter's Fort;* it was the first settlement in California reached by the overland immigrants. The fort itself has been restored. In 1848 the town was planned; it was incorporated the following year, was chosen as the state capital in 1854 and became a city in 1863. The commission form of government was adopted in 1912. During its early years the city suffered from floods, but a levee along the river has removed this danger. The stream is now crossed by several fine bridges within the city limits. S.G.A.

SACRAMENTO RIVER, the largest river in California, which drains a fertile valley in the northern half of the state, where the oldest settlements are located. It rises on the western slope of beautiful Mount Shasta and flows south into Suisun Bay, on the boundary between Contra Costa and Solano counties. The San Joaquin and Pitt rivers, the latter sometimes called the Upper Sacramento, are its principal tributaries, but it receives numerous other smaller ones from the gold-mining districts. The Sacramento is about 600 miles long, and its drainage basin has an area of 27,100 square miles. It is navigable for small boats to Red Bluff, about 300 miles above its mouth, and for large vessels to the city of Sacramento (see above).

SACRED COLLEGE, *sa'kred kol'ej,* the entire body of cardinals, who are appointed by the Pope and share with him in the government of the Roman Catholic Church. In dignity and influence they are second only to the Pontiff himself. Their number has varied from time to time, present usage fixing it at seventy, of whom six are bishops, fifty are priests, and fourteen, deacons. Generally speaking, their duties consist in administering the affairs of the Church, under the direction of the Pope. The greatest responsibility of the Sacred College, however, falls upon its members on the death of a Pontiff, when they assemble to elect his successor. In order to hasten their agreement, as well as to protect them from outside influences, they are subjected to strict discipline during this period; the ceremony befitting their rank is foregone, and they are debarred from intercourse with the public. For a discussion of the office of cardinal, and a list of American members of the Sacred College, see the article CARDINAL. G.W.M.

SACRIFICE, *sak'ri fise,* an offering to God for the purpose of communion, thanksgiving or means of atonement for sin, based on the idea that worship should consist not merely in words

but also in the giving of something dear to the worshiper. Two types of sacrifices were offered by the Jews, bloody and unbloody; that is, animals and fruits of the land. The bloody offerings were the *burnt offering,* a lamb, male and without blemish, offered twice daily by the priests in the name of the nation; the *peace offering,* a lamb or goat, male or female, without blemish, offered by families at new moons or on special occasions of thanksgiving, a part of which they ate according to prescribed rites; and the *guilt offering,* made by individuals for cleansing from sin and, once a year, on the Day of Atonement, by the priest for the sins of the nation. Unbloody, or *fruit offerings,* were offerings made on various occasions, of ears of corn, oil, incense, fine flour or unleavened cakes.

In the New Testament, the sacrifice of Christ on the cross, the innocent for the guilty, becomes the fulfilment of all former sacrifices: "For this He did, once, when He offered up Himself" (see *Hebrews* VII, 27).

SADDUCEES, *sad'u seez,* a religious sect active in Judea at the time of Christ, which had its origin among the aristocracy. Its members held many of the highest offices, and in contrast to the Pharisees, who kept themselves strictly from the world, they showed a strong inclination toward other than Jewish customs, valuing social standing, culture and wealth. Josephus, the Jewish historian, states that the Sadducees "had only the rich on their side, but not the common people." In belief, the Sadducees held to the written law of Moses, but denied the teaching of the Pharisees regarding the binding power of the oral law, the resurrection of the dead and the current doctrine of angels. They also affirmed the freedom of the will. After the fall of Jerusalem, in A.D. 70, the sect of the Sadducees disappeared. See PHARISEES.

SADI, *sah'de,* or *saw'de* (about 1184-1292), a great Persian poet, born at Shiraz. Under the protection of his patron, the Prince of Fars, he studied philosophy in Bagdad, and while there won fame by his writings. His patron was deposed by the Mongols in 1226, and Sadi in discouragement entered upon a period of wandering which continued for thirty years. After living for a considerable time in Damascus, he went to Jerusalem, where he dwelt as a hermit until he was captured by some Frankish crusaders and taken as a slave to Tripoli. Rescued by a wealthy friend, he returned at length to his home, where he spent his remaining years quietly.

His most important works, both of which were written near the end of his life, are the *Bustan,* or Fruit-Garden, and the *Gulistan,* or Rose-Garden, the former in verse, the latter in prose. Both are made up of discussions of philosophic and religious questions, interspersed with interesting tales and clever sayings.

SADOWA, *sah'doh vah,* BATTLE OF, was fought July 3, 1866, between the Prussians and Austrians, near the little village of Sadowa in Bohemia. The Austrian army of about 200,000 was commanded by General Benedek. King William I of Prussia directed the Prussians, who numbered 221,000. This battle was the decisive engagement of the Seven Weeks' War, as a result of which Prussia became the leading state of the North German Confederation and ultimately of the German Empire. See SEVEN WEEKS' WAR.

SAFE, a strong box of iron or steel, designed to protect money, jewels and valuable papers from loss by fire or theft. The simplest form is the fireproof safe, which is not intended to resist the assaults of burglars. It is a box having double walls of steel, between which a substance like concrete or clay is placed, to resist the action of heat. Such a safe is often imbedded in masonwork as a further safeguard.

The modern burglar-proof safe is a much more complicated structure. Expert cracksmen have called science to their aid, and make use of nitroglycerine and the oxyhydrogen blowpipe in reaching the interior of safes. To resist these attacks, safes are now made of great thickness, and weigh many tons. The walls are cast in a solid mass of iron or steel or built up of bars or plates of steel held in place by rivets. The cast-metal safes often have their strength reënforced by a network of wrought-steel rods, about which the metal is poured in a liquid state and allowed to harden. The vaults surrounding the safe of the Bank of France can be flooded from the Seine in case of danger, and in some banks steam can be released in similar circumstances.

Large safes of American manufacture are protected by several doors, one inside another. The bolts are controlled by time locks. These are clockwork devices which can be so adjusted that the bolts are drawn back automatically by a spring at the desired time. See LOCK.

SAFE'TY LAMP, a lamp designed to protect miners from explosions of fire damp. There are now many varieties of safety lamps on the market, but they are all based on the principle used by the English chemist, Sir Humphry

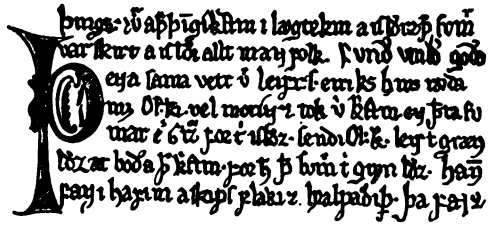
Davy, who invented the first lamp in 1816. It consists of an oil lamp surrounded by a cylinder of wire gauze of fine mesh, which forms a sort of cage. The heat of the flame will not pass beyond this gauze covering and ignite the gas on the outside until the wire becomes as hot as the flame, and owing to its good conducting power, it will not become so heated before the miner has time to withdraw from the chamber. One of the chief uses of the lamp is to warn the miner of the presence of the deadly fire damp; the other is to protect him from the danger arising from the presence of this gas. If fire damp invades the workings, it can be detected by lowering the wick, when a pale blue flame will be noticed about the central flame of the lamp. A reasonably prudent miner, observing this peculiarity, will at once leave the menaced workings, for explosions of fire damp are exceedingly destructive. See FIRE DAMP.

SAFETY VALVE, an appliance attached to steam boilers to allow steam to escape when the pressure becomes too great for safety. On stationary boilers the contrivance is quite simple; it is a kind of stopper, loaded with weights, closing a circular orifice. The weights are often hung at the outer end of a lever, and they hold the valve in place with a pressure which is carefully gauged so as to be several pounds below the pressure which it is thought the boiler may safely sustain. When the limit of safety is approached, the pressure of the steam raises the stopper and some of the steam escapes. The valve used on locomotive and marine boilers is held in place by a spring instead of a weight, but engineers prefer weights to springs wherever they can be employed advantageously, because the tension of the spring may vary, while the pressure of the weight is constant.

SAFFLOWER, *saf'lou er,* a thistlelike plant belonging to the Composite family (which see). It is cultivated in India, China, Egypt and Southern Europe for its orange-colored flowers. From these flowers, after they have been dried, yellow and red dyes are made. The red dye, which is the more valuable, is used to a limited extent in coloring silks in various shades of pink, rose, scarlet and crimson, but better substitutes have largely taken its place. It is also employed in the manufacture of rouge. The yellow dye is sometimes used to adulterate saffron (which see), but has little value as a coloring matter. Oil yielded by the seeds is used as fuel in lamps and for cooking purposes in the East.

SAFFRON, *saf'run,* a yellow coloring matter and flavoring material obtained by drying the stigmas of the yellow autumn crocus (see CROCUS). Four thousand flowers yield one ounce of commercial saffron. The product has a sweetish aromatic odor and a bitter taste. It is employed in cookery and to flavor and color candy, and, in Europe and India, as a condiment. Its use in painting and dyeing has declined with the discovery of cheaper coloring matters, and it is now considered of little value as a medicine, though once widely employed as a stimulant and preventive of spasms.

SAGAS, *sah'gaz,* or *sa'gaz,* the name given in Iceland to a form of literature which may best be described as the prose epic. The sagas are narratives, either historical, mythical or romantic, of the great heroes and rulers of



SPECIMEN OF SAGA MANUSCRIPT

Iceland, and they are composed according to rules as strict as those which govern verse. A typical saga traces the life of its hero from his birth to his death, including often, if his death was by violence, an account of the vengeance which his family took. Alliteration is common, and verse is often introduced as an ornament, though forming no part of the stories.

These sagas were originally preserved orally, and were composed to be recited at banquets or other festive gatherings, or in the long nights of that northern country where other diversions were few. By the twelfth century literary men had recognized the value of these tales and began to write them down, but by far the greater number were written in the thirteenth century. Naturally the aristocratic families were much interested in having the lives of their ancestors recorded in this form. Greatest of these compositions is the *Njalssaga,* the saga of law, but the *Eyrbyggiasaga,* with its store of history and traditions, is also a most valuable work. The romantic *Laxdaelasaga,* the *Gislasaga,* and the *Volsungasaga,* which contains the Nibelungen story in prose form, are also notable. The authors of some of these works are known, but there is no clue as to the identity of many of them.

SAGASTA, *sah gahs'tah,* PRAXEDES MATEO (1827-1903), a Spanish statesman and political leader who served his country during a critical period of its history. He began his career as a civil engineer. From the time he was elected to the Cortes of 1854 he held at various times the offices of Minister of the Interior, President of the Cortes, Minister of Foreign Affairs and Premier. Twice he was forced to flee to France, because of his prominence in the insurrections of 1856 and 1866. When events in Cuba were rapidly approaching a crisis, he was called to the head of affairs, and the unfavorable result of his earnest efforts to prevent war with the United States led to his resignation in 1899. He again assumed office in 1901 and resigned a year later when Alfonso XIII attained his majority.

SAGE, *sayj,* an herb of the mint family, cultivated for its aromatic stems and leaves, the flavor of which is due to an essential oil. Sage leaves are brewed to make a tea which has long been regarded as a standard household tonic and as an aid to digestion, and the plant is widely used to flavor sauces, dressings and cheese. There are numerous species of sage, both wild and cultivated. The common garden sage is a shrubby plant with rough, gray-green leaves and square stems. The flowers, which are blue with white and purple variations, grow in clusters. This plant can be propagated easily by slips or cuttings if grown in dry soil. Meadow sage, a blue-flowered species native to most parts of Europe, is cultivated as an ornamental plant in various parts of the United States. See MINT.

SAGE, RUSSELL (1816-1906), an American financier who acquired a fortune of $50,000,000 in railroad operations and stock speculation. He was born in Shenandoah, N. Y. His first great success was in company with Jay Gould, the greatest railroad manipulator of his time. Sage served his community in minor political offices and in 1853 was elected as a Whig to Congress, where he served two terms. The remainder of his long life was spent as a financier. He was a self-centered, austere man who made few friends and cared nothing for the criticism of his enemies. At his death his entire fortune was left to his wife, to dispose of as she pleased. See RUSSELL SAGE FOUNDATION.

Margaret Olivia Slocum Sage (1828-), wife of Russell Sage, was born at Syracuse, N. Y., and educated at the Troy Female Seminary. Since her husband's death she has become known as one of America's greatest philanthropists. The Russell Sage Foundatic established by her in 1907, "for the improv ment of social and living conditions in t United States," has an endowment fund $10,000,000. Out of this fund model apartmer have been built in New York City and its su urbs, and other work has been done along cha table, social and educational lines. Forest H Gardens, on Long Island, has been establish as a model suburban community, and Mar Island, in the Gulf of Mexico, has been pu chased as a home for birds.

SAGEBRUSH, *sayj'brush,* a group of dr shrubby plants belonging to the Composi family, several species of which are found c the alkaline plains of Western United State The profuse growth of sagebrush in Nevada h given rise to the popular name *Sagebrush State* for that commonwealth, and Nevada's flower emblem is the sagebrush. The typical species grows from six to twelve feet in height and has a straight, stiff stem, on which grow in close profusion small, wedge-shaped leaves with from three to seven notches. The flowers, which consist of many tiny florets, grow at the top of the branches. Though the two plants are not related, some species of sagebrush look like sage, and are known by such names as *silvery sage, black sage* and *white sage.* Some varieties of sagebrush form the winter forage of sheep on the Western ranges, and in some sections the settlers use the plants for fuel.

SAGE-BRUSH STALK

In the arid summer season on the plains the sagebrush dries until it shows no sign of green; when the high winds blow it frequently pulls loose and drifts over the plains in masses not unlike tumbleweed. Over thousands and thousands of square miles it is the characteristic, almost the only, form of vegetation.

SAGE GROUSE, *grous.* See GROUSE.

SAGHALIEN, *sah gah lyen',* **ISLAND,** th Japanese possession now known as Sakhali (which see).

SAG'INAW, MICH., the third largest ci in the state, next in size to Detroit and Gran Rapids, and the county seat of Sagina

:y, is a manufacturing city, about eighteen south of Saginaw Bay, sixteen miles west of Bay City and 105 miles northeast troit. It extends along both banks of the aw River, which is navigable from this to its mouth, and is here crossed by a er of bridges. Saginaw is served by the l Trunk, Michigan Central and Pere Mar- railroads and by electric interurban In 1910 the population was 50,510; it was (Federal estimate) in 1916. About fifty ent of the inhabitants are Germans, and are a number of Italians, Bohemians and The area of the city is about fourteen miles.

inaw has beautiful parks, of which the t are Rust (136 acres), Hoyt (twenty- acres), Linton and Bliss. Prominent ures are a Federal building, courthouse, all, city auditorium, the Mershon-Whit- ublic natatorium, Masonic temples, an y, Elks' Temple, Y. M. C. A. and Y. W. buildings and the public library. The pal institutions are the Burt Manual ing School, the Arthur Hill Trade School, has a United States Weather Bureau Sta- he Michigan Institute for the Blind, the olks' Home, the Germania Institute, Saint 's, Woman's, Saginaw General and Deten- ospitals, the Home for the Friendless and Vincent's Orphan Home.

inaw has extensive sugar-beet factories handle the large crops of the surround- gricultural country. Another important ry is the mining of bituminous coal, the t of which is sometimes 2,000,000 tons a The city once had large sawmills, but declined with the depletion of the forests state. The few which remain manufac- ough and dressed lumber, sash, doors and . Leading industrial establishments are factories of glass, rules, art furniture, g gears and silos. Here are located the Marquette car shops and a bean elevator, o be the largest of its kind in the world. ity has an important wholesale trade.

815 a settlement called Saginaw City was ed on the west bank of the river, and in a second settlement, East Saginaw, was on the opposite bank. The two were idated as Saginaw in 1890. In 1914 the ission form of government was adopted. vaterworks are owned and operated at a by the city. F.A.

ITTARIUS, *saj i ta'ri us,* THE ARCHER, nth of the twelve signs of the Zodiac. About November 22 the sun in its path around the earth enters the sign of Sagittarius. The westward movement of the equinoxes has placed Pisces (the Fishes) as the first of the twelve signs, a position previously held by Aries, the Ram. Some authorities still place Sagittarius as the ninth instead of the tenth zodiacal sign. In astronomy Sagittarius is represented by the sign ♐, a dart or an arrow, and Sagitta is the name of a constellation called the "arrow" or dart. According to ancient mythology the arrow is the one with which Hercules killed the vulture which devoured the heart of Prometheus, who was chained to a rock as punishment for having stolen sacred fire from heaven. The archer Sagittarius is a centaur, half man, half horse, a son of Eupheme, the nurse of the Muses.

According to Ptolemy, there are thirty-one stars in Sagittarius, all of them small. Tycho Brahe catalogued only fourteen stars, including several variable stars. In Sagittarius the Milky Way is particularly bright.

SA'GO, a food-starch obtained from the pith of several specimens of tropical palms native to the East Indies. The sago palm grows best in low, marshy soil, and attains a height of about thirty feet. The strong trunks of these trees have a hard outer layer about two inches thick; the central portion is spongy and contains the starch product. The trees devoted to the production of sago are not allowed to come to full maturity, for the ripening of the fruit exhausts the starchy center, leaving the trunk a more or less hollow shell and causing the tree to die. These palms are therefore cut down when they are about fifteen years old, being then just ready to flower. The stems are split up and from them is extracted the starch pith, which is reduced to a powder by grating. The powder is then kneaded in water over a cloth or sieve, through which it passes to a trough, where it settles. After a few washings the sago flour is ready to be used by the natives in making cakes and soups.

Sago prepared for export, however, is given further treatment. The flour is kneaded into a dough by mixing it with water, and the mass is forced through sieves, dropping on hot, greased pans in the form of small grains. The grains vary in size, giving rise to the commercial names of pearl sago, bullet sago, etc. The heat forms a covering of paste, so that when ready for the market the sago grains are small, translucent balls. These become larger when cooked, but remain separate, never massing.

Sago is used extensively in Europe and North America for making puddings and thickening soups. The Europeans also employ it in feeding stock and in starch making. It is a nutritious and an easily digestible food; over seventy-eight per cent of its ingredients consist of carbohydrates, and it has a fuel value of 1,635 calories per pound (see CALORIE; FOOD, subhead *Chemistry of Foods*). Borneo is the largest producer of sago.

SAGUENAY, *sag eh na',* **RIVER,** an important river of Quebec, tributary of the Saint Lawrence. It is a deep, dark, gloomy stream, world-renowned for the grandeur of its scenery, particularly in its lower parts. The Saguenay issues from the eastern end of Lake Saint John, and flows for 110 miles in a general easterly direction into the Saint Lawrence, its mouth being 120 miles northeast of Quebec (see map, facing page 1096). For a distance of forty miles below the lake it is a series of rapids and cataracts, navigable only for canoes. There the river flows between hilly banks, about 400 feet high, covered with dense growths of spruce, maple and birch. At Chicoutimi it becomes navigable for small steamers and at Ha Ha Bay, six miles farther, for larger vessels. Ha Ha Bay is about nine miles long and the same distance wide, and is a noted resort for tourists and summer residents.

From Ha Ha Bay to its mouth, a distance of sixty miles, the Saguenay flows through a rocky, treeless gorge, which gradually rises to a height of 1,800 feet at the Saint Lawrence. The line of cliffs is broken here and there by narrow, green valleys, but for most of the way it casts its dark shadows over the waters. The Lower Saguenay is really a fiord or loch, rather than a river. It is from three-quarters of a mile to two miles wide, and has a depth ranging from 800 to 2,000 feet. At its mouth it is 600 feet deeper than the Saint Lawrence, into which it flows. Tadoussac, at the confluence, is a popular watering place and was the first European trading post in Canada.

Lake Saint John, from which the Saguenay issues, is a shallow body of water covering an area of 350 square miles. It receives numerous important rivers, one of which, the Peribonka, is generally accepted as the upper course of the Saguenay. From Tadoussac to the head of the Peribonka is a distance of 405 miles. Lake Saint John is famous for its *ouinaniche,* or land-locked salmon, a fish which often attains a weight of five or six pounds, and is an excellent food fish.

SAHARA, *sa hah'ra* (in Arabic, *sah'h'rah*), a vast desert in Northern Africa. It extends roughly from the Atlantic Ocean on the west to the valley of the Nile on the east, and from the Sudan on the south to the Atlas Mountains and the Mediterranean Sea on the north (see colored map of Africa, opposite page 81). Thus, it encroaches on Egypt, Tripoli, Tunis, Algeria and Morocco. Its physical limits are not everywhere as sharply drawn as they are in those parts of Algeria and Morocco where the traveler looks down from the ramparts of the Atlas range upon an undulating and limitless waste. Elsewhere the confines of the desert are often less easy to trace, being merged with the fertile surrounding territory, especially to the south. The greatest length of the desert is 3,200 miles, along the twentieth parallel of north latitude; its breadth from north to south varies from 800 to 1,400 miles. Its area is estimated at three and a half million square miles —about that of Canada, or of Europe without the Scandinavian peninsula, or nearly that of the United States, including Alaska.

Physical Features. The central plateau extends about three-fourths the distance across the desert, in a northeasterly southwesterly direction, and has an elevation ranging from 1,900 to 2,500 feet. Three mountain ranges, the Ahaggar, the Tibesti and the Air, rise above this plateau. The highest peaks have altitudes varying from 6,000 to over 9,000 feet. During the winter their summits are capped with snow. In this mountain region are numerous river valleys. The Western Sahara is a vast sand waste, and to the north and east of the central plateau is the Libyan Desert, a barren waste without animal or vegetable life, excepting on a few oases. The Libyan Desert extends to the Nile. The region between the Nile and the Red Sea is mountainous. The Sahara contains extensive regions covered with sand dunes, whose form is constantly changing under the action of the wind.

Oases. Oases occur in depressions, a number of which are below sea level. They are watered by springs that are fed by underground streams, which in turn receive their supply from water that sinks through the sand to an underlying layer of clay. The best authorities believe that by sinking wells the tillable area might be greatly extended, for the soil is fertile, and wherever water can be obtained tropical fruits, millet and other cereals may be raised in abundance. The oases are the centers of population.

Excepting on the oases, this vast region is practically without life. Few animals have penetrated to the interior, but on the borders where water is obtainable the lion, the panther, the hyena, the jackal, the fox and some species of ape are found. Venomous serpents are numerous, and in some regions the huge python makes its home.

Climate. The dry climate is due to atmospheric conditions. During the winter the winds blow outward in all directions and so bring no moisture to the country. During summer the intense heat causes the air to expand and to absorb all the moisture it receives. In summer the days are exceedingly hot, but the nights are cool. Terrific windstorms blow over the region, carrying such quantities of sand as to imperil travelers.

The People and Commerce. The Tuareg tribes control the caravan routes of the central region. Moors inhabit the Adrar region in the west, and nomad Arabs cross the northern border. Tibbus, negroes and Jews are found in the other parts. The population is sparse, the most liberal estimates placing it at 2,000,000, or less than one person to each square mile.

Caravans cross the desert from Tripoli to Zinder, Kano and other towns in Central Africa. Other routes cross the Western Sahara to Timbuktu. The chief articles of trade are silk, salt, ivory, spices, ostrich feathers and musk. G.B.D.

Consult Sommerville's *Sands of Sahara;* Haywood's *Through Timbuctu and Across the Great Sahara.*

Related Subjects. The following topics will be of interest in connection with this article on the Sahara Desert

Arid Region	Khamsin
Camel	Oasis
Caravan	Simoom
Desert	Sirocco

SAIGON, *si gohn',* one of the finest cities in Asia, the capital of the French colony of Cochin-China (which see). It lies on the right bank of the Saigon River, about thirty-four miles from the coast (see colored map of Asia, opposite page 417), and is more than six square miles in area. In 1913 the city had an estimated population of 72,000, of whom about 12,000 were Europeans. A garrison of over 2,000 soldiers is stationed here. Saigon exhibits a pleasing combination of Oriental charm and Western progress. The broad, regular streets and public gardens are made attractive by rows of shade trees, and the city enjoys such modern innovations as electric lighting, electric tramways, a filtering system, telegraph and postal service and railway connection with other parts of the colony. There is an excellent harbor, with accommodations for the largest ocean vessels, and in normal years over 600 ships clear the port annually. The city is a center of rice manufacture, and has also sawmills and factories for making soap and varnish. Notable buildings include the governor's palace, the town hall, a city theater and a $400,000 cathedral.

SAIL'BOAT AND SAIL'ING. Almost any small boat may be converted into a sailboat by raising a mast and attaching a sail to it. But unless a boat has great stability it is likely to be capsized by a sudden squall, and so the safest sort of sailboat for boys to go cruising

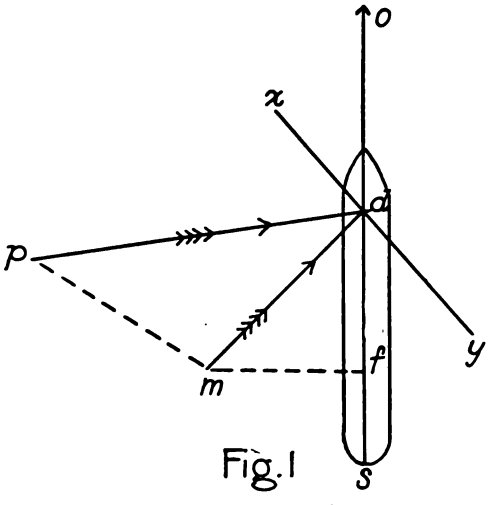


Fig. 1

Explanation appears in the text.

in is a flat-bottomed boat, or punt. A punt may be turned into a capital sailboat by boarding over the hull and finishing the inner edge of the deck with a combing, to prevent any water that may splash over the sides from flowing into the cockpit. A hole is then cut in the forward deck and a square block with a hole in the center is nailed to the bottom immediately beneath. A mast of pine or spruce wood, about three inches in diameter at the base and twelve feet high, is placed in the hole, and held in place by a wire stretching from its top to the bow of the boat. Such a mast will carry a boom fourteen feet long, on which may be spread a triangular sail eleven feet high and twelve or thirteen feet at the bottom.

The sail is attached to the mast by a number of sliding rings, and is hauled up and down by

a rope passing through a pulley at the masthead. To give steadiness to such a boat, since it has no centerboard or keel, it is necessary to use a leeboard when sailing on the wind. This is a flat board hung over the lee side (the side away from the wind) and lashed securely in place. It keeps the boat from being blown sideways. The sail may be made of twilled duck or heavy unbleached muslin, sewed by hand or on a machine. Seven or eight rings, sliding on the mast, will bring the sail up and down.

Sailing. It is easy to understand how a boat sails with a breeze behind it; it is not so easy to understand how it can be made to sail against the wind. As a matter of fact, however, a boat does not sail best with the wind straight

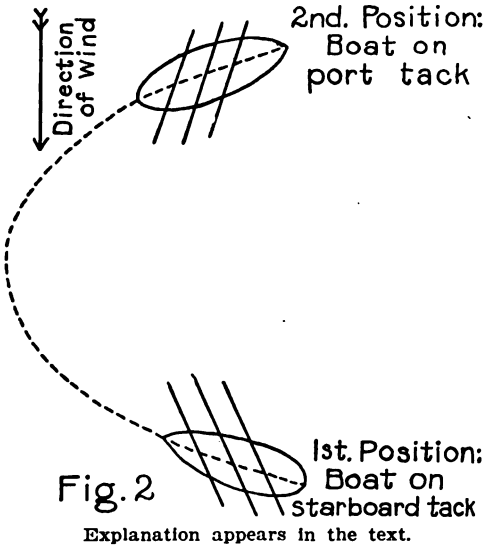


Fig. 2

Explanation appears in the text.

aft; a breeze from the side is better. The accompanying diagram (Fig. 1) will give an idea of what makes the boat go forward when the wind is on its beam. Here *xy* is the sail and *pd* the wind. The wind blowing against the slanting sail is deflected and causes a pressure, *md*, perpendicular to the surface. The pressure, *md*, can be resolved into two components, *mf* and *fd*. The former tends to push the boat sideways but is largely counteracted by the push of the water against the boat's side; *fd* is in the direction of the ship's course and propels it towards *o*.

Tacking. A vessel is said to be on the port tack when the wind is on its port, or left side, and on the starboard tack when the wind is on its starboard, or right side. When it comes up with its nose in the wind and changes from one tack to the other, it is said to be tacking. Fig. 2 shows the changed position which the sails of a vessel assume in changing from the starboard to the port tack.

In tacking, the vessel's bows are pointed towards the direction from which the wind is blowing. The sail is almost parallel with the wind and consequently falls slack. The boom is pushed across the boat, and the rudder used to turn its nose sufficiently out of the wind so there is an effective pressure against the sails in the new position. See YACHT AND YACHTING.

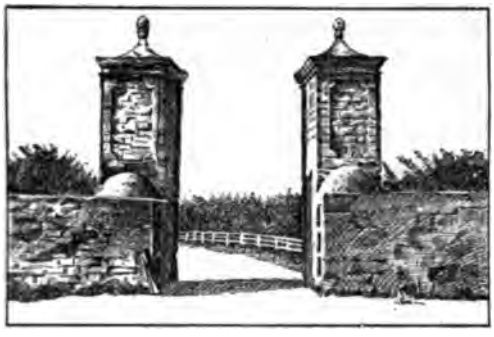
Consult Davies' *Boat Sailing for Amateurs;* Kingston's *The Boys' Own Book of Boats;* Knight's *Small Boat Sailing.*

SAINT ANDREWS, *an'drooz,* the county town of Charlotte County, New Brunswick, in the southwest corner of the province. It is on Passamaquoddy Bay, at the mouth of the Saint Croix River, and is one of the Atlantic termini of the Canadian Pacific Railway. It is about sixty miles directly west of Saint John, and forty-eight miles by rail southeast of Calais, Me. The harbor of Saint Andrews is open all the year round, and accommodates the largest vessels even at low tide. There is a large trade in fresh fish, and the canning and preserving of fish, especially sardines, is one of the chief branches of manufacturing. The only other manufactures of importance are mattresses and leather goods. Population in 1911, 987; in 1916, about 2,000.

SAINT AUGUSTINE, *aw'gus teen,* FLA., the oldest city in the United States, is situated on a narrow strip of land between the San Sebastian River on the west and Matanzas River on the east, thirty-two miles south of Jacksonville and on the Florida East Coast Railway. The Matanzas River is really an arm of the sea separating North Beach and Anastasia Island from the mainland, and it is often called Matanzas Bay. Saint Augustine Inlet, a passage between North Beach and Anastasia Island, gives the city access to the ocean. Saint Augustine is the county seat of Saint Johns County. Its business is chiefly local. Population, 1910, 5,494.

Saint Augustine was permanently settled by the Spaniards in 1565, and it still retains many structures that date back to the first century of its existence. The city is of interest chiefly as a winter resort and because of its historic associations. The streets are very narrow, some of them so narrow that teams cannot pass each other. The city is regularly laid out, the streets running east and west and north and

south. In the center of the city is the Plaza, a small park beautifully laid out in walks, lawns and flower beds. To the west of the park is the old residence of the Spanish governors, now used for the post office. This is without doubt the oldest public building in the United States. On the north is the Roman Catholic Cathedral, built in 1793. In the belfry is a chime of bells, one of which bears the date



OLD CITY GATE

The exact date of construction is not known, but from the earliest period of Saint Augustine's history some form of gate existed, for the defense of the settlement. The existing gate was repaired and put in substantially its present condition in 1809, the year of the Peninsular campaign of Napoleon in Spain. Soon after that date the gate was closed and was not again opened for miscellaneous traffic until Florida was transferred by Spain to the United States in 1819. While nominally closed, a wicket in the gate admitted foot passengers, but men on horseback or in carts could not be admitted without permission from the guard.

1689. Within the Plaza are located the old slave market and the Spanish and Confederate monuments.

Saint Augustine is a city of palms, shrubs and flower-covered lawns. As a resort it is very attractive, and contains some of the finest hotels in America. The largest of these is the Ponce de Leon, noted for its Spanish and Moorish architecture, luxurious furnishings and beautiful grounds. Next to the Ponce de Leon in importance is the Alcazar. The Cordova and the Saint George are also well-known hostelries. Other modern structures of interest are the Memorial Presbyterian Church, the Zoryda Club and the lighthouse on Anastasia Island. The tower is 165 feet high and the light can be seen twenty miles at sea. This is a lighthouse of the first order. The island is connected with the mainland by a bridge, and an electric line enables visitors to visit the light and other points of interest, including an alligator farm and a bathing beach.

Fort Marion, on the water front north of the city, is the chief object of historic interest. It was begun in 1586 and completed in 1756. During the early period of its construction the labor was performed by slaves brought from Mexico, and native Indians, whom the Spaniards enslaved for the purpose. The walls are coquina, or shell rock. They are twenty-five feet high, and in the thickest part forty feet thick. The fort is an irregular structure covering five acres. It was patterned after the old castles of the Middle Ages and is the only fortress in America constructed on this plan. The old city gates, completed in 1727, are also of interest. They were the only entrance through the north wall, which with the moat protected the city from land invasion. S.T.K.

Consult Powell's *Historic Towns of the Southern States;* Brooks' *Unwritten History of Old Saint Augustine.*

SAINT BARTHOLOMEW'S, *bahr thol'o muze,* **DAY,** MASSACRE OF, a massacre of French Protestants which began in Paris early in the morning on the feast day of Saint Bartholomew, August 24, 1572. The massacre was the result of years of strife between the Roman Catholic and Huguenot (Protestant) parties in France. In 1570, however, a peace treaty was made, according to which Prince Henry of Navarre, a Huguenot leader and sympathizer, was to marry Margaret, the daughter of Catharine de' Medici and the sister of King Charles IX. The wedding festivities took place in Paris a few days before Saint Bartholomew's Day, and among the powerful Huguenot leaders who came to the city to attend them was Admiral Coligny. The admiral, who had considerable influence over the weak young king, roused the hatred and fear of the queen mother by attempting to draw her son away from her. Accordingly, she tried to have Coligny assassinated.

When this plot failed, Catharine, together with the Guises, uncles of the king and stanch Catholics, persuaded Charles that Coligny was a dangerous enemy and induced him to sign a decree ordering the massacre of the Huguenots. He is reported to have said, "By God's death, since you insist that the admiral must be killed I consent, but with him every Huguenot in France must perish, that no one may remain to reproach me with his death, and what you do, see that it be done quickly." A fanatical mob joined the executioners in Paris on Sunday, August 24, and the massacre was taken up in the provinces, but in many districts public sympathy was so strong that the officers of the law dared not murder their innocent fellow

citizens. The number who perished is variously given, estimates ranging from 2,000 to 100,000.

Related Subjects. The following articles in these volumes contain further information as to the Massacre of Saint Bartholomew's Day:

Catharine de' Medici	France, subhead
Charles IX	*A Period of Wars*
Coligny, Gaspard de	Guise
	Huguenots

SAINT BERNARD', a breed of large dogs developed by the monks of the monastery of Saint Bernard, located in the Swiss Alps. This hospice is situated near a dangerous pass, and its inmates breed and train the dogs to rescue

SAINT BERNARD DOG

travelers lost in the snow and ice. So keen is the scent and so remarkable the intelligence of these animals that they have been the means of saving countless lives.

The Saint Bernards are the largest of domestic dogs. Fine physical specimens are almost three feet high and weigh 150 pounds. The body is well built, erect and muscular, the back broad, the legs large and strong, the head imposing and the expression intelligent. Two varieties are seen, the smooth-coated and the shaggy-coated. The coat is usually white, with patches of black or tawny. Every day the monks send the dogs out to test passageways over dangerous chasms, trackless wastes of snow and perilous glaciers. In their rescue work they are aided by the keenness of their sense of smell, which enables them to detect a body buried under several feet of snow. A flask of brandy is usually tied about the neck of a dog for the benefit of half-frozen travelers, and the rescuers call for assistance by loud and prolonged barking. The reader will find an interesting outline for an essay on the Saint Bernard on page 1829.

SAINT BERNARD, *ber nahrd'*, GREAT, a famous pass over the Alps, now noted chiefly for the hospice at its summit. The hospice was founded in the eleventh century by Saint Bernard of Menthon and has been maintained by the Austin (or Augustinian) canons since the twelfth century as a refuge for travelers. With the aid of their famous dogs (see SAINT BERNARD) the good priests save the lives of many wayfarers in the winter months. Most of the guests in winter are Italian workmen who are too poor to pay railroad fare.

In the summer and autumn many foreigners visit the hospice. It now has accommodations for over 300 people, but nobody is ever allowed to spend longer than one day there except in the case of illness, injury or terrible winter storms. The visitor announces his arrival by ringing a great bell which hangs in the entrance hall, and before its clanging echoes have died away in the distant corridors a priest appears to ask his wishes. No payment is permitted for food and lodging, but every visitor is expected to place a contribution, according to his means, in a little box in the chapel. So severe is the life of the priests in the winter that only young men are chosen for this service. When they reach the age of thirty or thirty-five the altitude (8,100 feet) and the severity of the winter usually force the priests to retire to the mother-house at Martigny, in the Rhone Valley.

From Martigny an excellent carriage road runs over the pass to Aosta, Italy, a distance of fifty-three miles. It was by this route, then traversed only by a bridle path, that Napoleon led an army of 30,000 men with baggage and artillery to invade Italy.

Saint Bernard, Little. About fifteen miles southwest of the Great Saint Bernard is another pass, the Little Saint Bernard. At its summit is also a hospice founded by Bernard of Menthon and now maintained by the Austin canons. This pass is the easiest route by which the Alps may be crossed, and has a good carriage road. It rises to a height of 7,170 feet above the sea, and is ten miles south of Mount Blanc, the highest peak in Europe. Some historians state that Hannibal, in an expedition against Rome, crossed the Alps by way of the Little Saint Bernard. W.F.Z.

SAINT BONIFACE, *bon'i face,* a city in Manitoba, on the Red River directly east of and opposite the city of Winnipeg. Connecting Winnipeg with Saint Boniface are six bridges, the largest of which, the new Broadway Bridge,

cost $600,000. Saint Boniface is the county seat of Provencher County and the seat of the Roman Catholic archbishop of Manitoba. It is served by the Canadian Pacific, Canadian Northern (main line), and National Transcontinental (main line). It is also on the Great Northern Railway, which runs directly to Minneapolis and Saint Paul and other cities in the United States. An electric railway runs to Winnipeg, and another extends to Saint Vital, where the new buildings of the provincial agricultural college and university are located. Population in 1911, 7,483, an increase of 270 per cent over 1901; in 1916, 11,022.

Saint Boniface is steadily growing in importance as a manufacturing center, the annual value of its products being from $7,000,000 to $8,000,000. This is approximately one-fourth of the value of Winnipeg's production, and a little less than one-sixth of the total for Manitoba. The principal manufactures are meat and meat products, flour, lumber, bricks, linseed oil, paints and dyes, tar paper, sashes and doors and other building materials. One of the flour mills is said to be the largest in the British Empire, and the stockyards, which were constructed and equipped at a cost of more than $1,000,000, are probably the greatest in Canada. Hydroelectric power, supplied by the Winnipeg River, is an important factor in manufacturing.

The city has numerous religious and educational institutions. In addition to the public schools there are Saint Boniface College, affiliated with the University of Manitoba, a provincial normal school, Saint Adelard's Orphanage, the convent of the Sisters of Jesus and the Juniorate of the Oblate Fathers. The Anglicans, Methodists and Presbyterians have churches here, and the Roman Catholic cathedral, which was completed in 1908 and cost over $400,000, is the largest west of Toronto. The bells in its towers were recast from the old bells which hung in the Saint Boniface mission for half a century—those bells of which the poet Whittier wrote:

> The voyageur smiles as he listens
> To the sound that grows apace;
> Well he knows the vesper ringing
> Of the bells of Saint Boniface.

SAINT CATHARINES, *kath'a rinz,* a city in Ontario, the county town of Lincoln County. It is in the northern part of the Niagara Peninsula, on the Welland Canal, and on the Grand Trunk and the Niagara, Saint Catharines & Toronto railways. It is thirty-two miles by rail southeast of Hamilton, eleven and one-half miles north of Niagara Falls and forty-seven miles northwest of Buffalo. Saint Catharines is an important manufacturing center, its chief products being boilers, tools of various kinds, electric lamps and fittings, shoes, paper, knitted goods and biscuits. The annual output of manufactured articles has a value of more than $6,000,000 or about $400 per capita of the city's population. The county buildings, public library, municipal building and the collegiate institute are noteworthy structures. Bishop Ridley College, an Anglican secondary school for boys, is located here. Mineral springs near by have given Saint Catharines considerable fame. Population in 1911, 12,484; in 1916, estimated, 15,000.

SAINT CHARLES, Mo., the county seat of Saint Charles County, an important manufacturing city situated about nineteen miles northwest of Saint Louis, and on the Missouri River about twelve miles from its entrance into the Mississippi River. Transportation is provided by the Wabash and the Missouri, Kansas & Texas railroads, and an electric line extends to Saint Louis. This locality is rich in agricultural products, especially in wheat and corn. Besides a car manufactory, which employs about 1,800 men, and is one of the largest of its kind in the United States, the city has large shoe factories, engine works, grain elevators and tobacco factories. The Federal building, county courthouse, erected in 1902 at a cost of $150,000, and Saint Joseph's Hospital are prominent buildings. In addition to the public and private schools, there are Lindenwood College, for women, Sacred Heart Academy, Saint Charles Military College and a public library. The first settlement was made in 1765; it was incorporated in 1795 and was chartered as a city in 1805. The inhabitants are chiefly Americans and Germans; the population increased from 9,437 in 1910 to 10,350 (Federal estimate) in 1916. J.H.W.

SAINT CHRISTOPHER, *kris'toh fer,* or **SAINT KITTS,** *kits,* one of the Leeward Islands, in the British West Indies. It is of volcanic formation, covering an area of sixty-five square miles, with a mountain range in the center culminating in the peak of the extinct volcano Mount Misery, 4,000 feet above the sea. The climate is healthful, the soil fertile, sugar, rum, coffee and cotton being the chief products. The capital is Basse Terre, a seaport with an open roadstead. Saint Christopher, with Nevis and Anguilla, adjacent islands,

snows on most days above an altitude of 4,500 feet. Mount Logan, the highest point, rises to an altitude of 19,500 feet, according to the measurements of Professor Israel C. Russell, who named the peak. Mount Saint Elias is next in height, towering 18,026 feet above the sea. The majestic beauty of the latter is best appreciated when viewed from the Pacific Ocean; the seaward slope is exceedingly steep and is covered with glaciers. It was discovered and named in 1741, by Bering, a German navigator in the Russian service, but was not explored until 1874, when the United States, which had purchased Alaska from Russia in 1867, sent an expedition to examine the glaciers encircling the mountain. The first ascent to the summit was made in 1897 by the Duke of the Abruzzi. Other peaks of the chain are Mount Fairweather, Mount Cook and Mount Vancouver.

SAINT EL'MO'S FIRE, the name given to an electrical display in the form of a circle of light sometimes seen, especially in Southern regions, during thunderstorms, about the masts of ships, at the tops of spires and trees, on the manes of horses and occasionally about human heads. Among the Greeks the phenomenon was the basis of the myth of Castor and Pollux, and was regarded by sailors as a friendly omen. See CASTOR AND POLLUX.

SAINT ETIENNE, *saN' ta tyen'*, an important town in Southern France, famous for its ribbon manufactories, whose annual output, valued at about $12,000,000, is shipped to all parts of the world. The town is in the department of Loire, of which it is the capital, and is situated on both banks of the Furens, thirty-six miles southwest of Lyons. This stream furnishes the valuable water power which promotes the extensive manufactories, and its waters are peculiarly adapted to the tempering of iron and steel. The first industry of the town, sword making, was introduced in 1535. The ribbon factories are famous to-day; they contain over 30,000 looms, and the ribbons are unrivaled in beauty of design, richness and delicacy of color.

The houses in the newer part of the town are without architectural harmony. The buildings are of white sandstone, which has become dingy from the smoke of many factories. The most interesting building is the Industrial Museum, where are exhibited specimens of the manufactures and other products of the town, and minerals and fossils of the neighborhood. Saint Etienne is located on a large coal field, and about 600,000 tons of coal are mined annually. Extensive coaling establishments, blast furnaces and cutlery works are kept in constant operation, besides factories which supply most of the muskets of the French armies. Population, 1911, 148,650.

SAINT GAUDENS, *gaw'denz,* AUGUSTUS (1848-1907), the greatest of American sculptors, ranks among the world's foremost workers in the field of plastic art. Although Irish by birth, he has expressed for his adopted countrymen their feelings and aspirations in the famous *Sherman* equestrian statue, Central Park, New York City, the *Shaw Memorial,* Boston Common, and the *Lincoln* statue, Lincoln Park, Chicago.

Saint Gaudens was brought to America from Dublin when but three months old. He left school in New York City at the age of thirteen

"GRIEF"

In this monument, in Rock Creek Cemetery, Washington, D. C., Saint Gaudens "set the mark of authentic individuality on a universal emotion. This figure is worthy to rank with the work of Michelangelo."

to work for a cameo cutter, and he studied drawing at night in Cooper Institute. When he was twenty he went abroad, studying for six years in Paris and later in Rome. His earliest work was *Hiawatha,* done while he was in Rome. While in Paris in 1878 he completed the noble

Saint Cloud is popularly known as the *Granite City,* because of its immense granite deposits. Quarrying, cutting and polishing the granite constitute the leading industry; the yearly output is valued at $1,200,000. The color of the stone varies from black to light, delicate tints, and it is widely used in the construction of important public buildings. The city has also paper mills and railroad and machine shops. Electrical energy is supplied by power plants on the river.

Saint Cloud has a Federal building and a Carnegie Library, and is the seat of the state reformatory and of a state normal school, the latter equipped with buildings costing $300,000. The place was settled in 1852, and in 1868 it became a city. The commission plan of government was adopted in 1912. The waterworks are owned by the municipality. P.J.S.

SAINT-CYR, *saN seer',* LAURENCE GOUVION, Marquis de (1764-1830), a famous soldier, marshal of France. Born at Toul, he entered the army as a volunteer in 1792, taking a conspicuous part in the campaigns on the Rhine and in Holland. In 1798 he was sent to take command of the army in Italy, succeeding Masséna. His reorganization of the army and brilliant campaign established his reputation and in 1800 he returned to Germany and won a decisive victory at Biberach. His military ability was at once seen by Napoleon who, after employing him as ambassador to Spain in 1801, sent him again to Italy as commander of the army of occupation in Naples. The favor of Napoleon being withdrawn he resigned in 1809. For the invasion of Russia it was impossible to overlook his merits, and he was reinstated, proving the justice of Napoleon's selection by winning a brilliant victory at Polotek. In 1813, in the battle of Dresden, he was captured. At the end of hostilities he returned to France, and after the downfall of Napoleon served for two terms as Minister of War.

SAINT-DENIS, *saN' de ne',* a suburb of Paris in the Metropolitan Department of Seine, two miles north of the limits of the French capital. The town is well protected by ramparts and a fort, and is one of the outer defenses of Paris. It is noted for its beautiful abbey church, one of the finest examples of Gothic architecture in France. This church is on the site of one built in the seventh century by Dagobert I, which was used as a mausoleum for the rulers of France until the French Revolution. In 1793 the building was partially destroyed and the bodies were removed from the royal tombs, but the church was later restored to its former grandeur. Napoleon founded in Saint-Denis an institution for the free education of women who were related to the officers of the Legion of Honor. Industrially the town is important for its great annual sheep fair. The chief industrial plants are cotton and flour mills, dyeworks and bleacheries and chemical factories. Population in 1911, 71,759.

SAINTE ANNE DE BEAUPRÉ, *bo pra',* a village in Montmorency County, Quebec, on the north bank of the Saint Lawrence River, at its junction with the Sainte Anne. It is twenty-one miles northeast of Quebec, on an interurban electric railroad. It is an important lumbering center, and has about a dozen sawmills, but is better known for its famous shrine. For over two centuries Sainte Anne has been famous as a Roman Catholic shrine, and many miraculous cures are said to have been performed. The permanent population of the village is about 2,000 (2,066 in 1911), but on feast days, especially that of Sainte Anne (July 26), over 25,000 people have often been present. About 200,000 pilgrims visit the village each year.

SAINTE-BEUVE, *saNt' buv',* CHARLES AUGUSTIN (1804-1869), a French essayist, influential as a literary critic, was born at Boulogne-sur-Mer, and educated there and at Paris. He practiced medicine a short time, but by 1827 had written such excellent newspaper articles as to attract the attention of Victor Hugo, and the introductions to famous writers thus gained led him to devote his entire time to literature. He wrote three volumes of highly finished but rather morbid poetry and one novel, *Volupté,* showing his religious unrest; but his fame rests upon more than fifty volumes of critical and biographical articles. A warm partisan of Napoleon III, he was chosen by the Emperor as professor of Latin poetry at the Collège de France, but was so shamefully mistreated by anti-imperialist students that he resigned. His keen appreciation of the permanently good, his vast knowledge and delicate, precise style place him among the leading literary critics in any language.

SAINT ELI'AS MOUNTAINS, a broad chain of mountains, with many peaks and ridges, extending from the southeastern part of Alaska into the northwestern part of Canada. This range gives off many prodigious glaciers, the largest being the Malaspina. Owing to climatic conditions prevalent in this region it rains almost every day on the lower slopes and

African coast and 700 miles southeast of Ascension Island, which is the nearest land. Its chief claim to fame lies in its having been the enforced home of Napoleon Bonaparte from 1815 until his death, May 5, 1821 (see NAPOLEON I).

The island is a rugged, mountainous mass, of volcanic origin, lonely and desolate, with an area of forty-seven square miles, surrounded by forbidding cliffs rising in places to a height of 800 and 1,000 feet. The only village and port is Jamestown, a fortified place lying at the mouth of a small mountain stream which flows into Saint James' Bay, an open roadstead.

The British garrison, on which the islanders principally depended, was withdrawn in 1906, leaving the natives to their own slender resources. Great depression resulted. One-fifth of the area is available for cultivation, but a part of that is under grass and was valuable for raising cattle and sheep when the garrison offered a market. The principal crop is potatoes, which are sometimes exported. With government help factories for making fiber mats have been successfully established, and fish curing and lace making are carried on. The population consists of mixed Europeans, East Indians and natives of Africa, and numbers about 3,550.

During the South African War in 1899-1902 Saint Helena was used as a place of detention for prisoners of war, among them being General Cronje, who, after peace was declared, visited the United States.

SAINT HYACINTHE (in French, *saNt' ee a saNt'*), a city in Quebec, the county town of Saint Hyacinthe County. It is on the Yamaska River, which encloses the town in a semicircular bend, and is on the Grand Trunk, Canadian Pacific, Intercolonial and Quebec, Montreal & Southern railways, the last having direct connection with the Delaware & Hudson in the United States. By rail Saint Hyacinthe is thirty-six miles east and a trifle north of Montreal. Population in 1911, 9,797; in 1916, about 12,500.

Saint Hyacinthe is an educational as well as a manufacturing center. It has the Saint Hyacinthe Academy, founded in 1811, several monasteries and convents, the Academie Prince for girls and the Academie Girouard for boys, all under Roman Catholic direction. These are in addition to the primary schools managed by the Protestant school board. A branch of the Sacred Heart College of Athabaska and the provincial dairy school also deserve mention. The latter was the first dairy school in Canada and the second in America. Of its manufacturing establishments the largest is a factory for making knit goods; it has 1,500 employees. Other important products of the city are shoes, leather, church organs, hosiery, woodenware, biscuits, gloves, corsets, shirts, farming implements and other kinds of machinery. The city owns its waterworks and electric power system; there is also a private electric power station.

Saint Hyacinthe was founded in 1775, and was incorporated as a city in 1857. It took its name from Jacques Hyacinthe Simon de Lorme, of Quebec, contractor for platforms and artillery carriages for the armies of France. He acquired a seigniory, in which Saint Hyacinthe was built, in 1753. In 1903 the city suffered a $1,000,000 loss by fire.

SAINT JEROME, *zha rome'*, the county town of Terrebonne County, Quebec. It is situated at the foot of the Laurentides Mountains, on the Rivière du Nord (River of the North) and on the Canadian Pacific and Canadian Northern railways, thirty-three miles by rail northwest of Montreal. It is the most important town in the district north and northwest of Montreal, and is best known as a manufacturing center. Among its many industrial establishments are a large rubber factory, with over 500 employees, a pulp mill with 300 employees, and several creameries, a tannery, foundry, planing, carding and grist mills, and factories for making pianos, metal goods, shoes, blouses and doors. The value of all manufactures is close to $1,000,000 a year. The town was settled in 1830 and was incorporated in 1881. Since 1912 it has owned and operated its electric light and power system. Population in 1911, 3,473; in 1916, estimated, 4,000. C.L.DE M.

SAINT JOHN, the county town of Saint John County, New Brunswick, and the largest city and commercial metropolis of the province. It is on the southern shore of the province, and is picturesquely located on a rock-ribbed peninsula overlooking the Saint John River and the Bay of Fundy. It is served by the Canadian Pacific and the Intercolonial railways, whose terminal stations are among the conspicuous structures of the city. Saint John is 275 miles by rail northwest of Halifax, its rival for commercial supremacy in the Maritime Provinces. Moncton is eighty-nine miles northeast, and Fredericton, the provincial capital, is sixty-six miles northwest. Population in 1911, 42,511; in 1916, estimated, 60,000.

Saint John as a Port. The town is unique among Canadian cities in that it owns its own

harbor, which is under the direct control of the commissioners elected by the voters. The harbor and its approaches have a minimum depth, at low tide, of thirty-two feet, deep enough for the largest ship afloat. The harbor is never frozen over, a fact which has made Saint John "the winter port of Canada." In winter, when the Saint Lawrence is closed by ice, Saint John receives the larger part of the export and import trade which would otherwise go to Montreal and Quebec. Its foreign trade now has a value of $50,000,000 or more a year, a figure exceeded only by Montreal among Canadian Atlantic ports. Grain, lumber, meat and flour are the chief exports.

Saint John's high standing as a port is due in part to its natural advantages, but also to the government policy of subsidizing steamship lines. This policy was inaugurated in 1895 and was extended in 1898. There are now nearly twenty subsidized lines, the most important of which run to Liverpool, London, Dublin and other British ports. To some extent steamship service was interrupted by the War of the Nations, but will undoubtedly be increased on the conclusion of peace.

Manufactures. The city is also a distributing point for the southwestern part of the province. Much of its domestic trade is in its own manufactures, the chief of which are refined sugar, cotton goods of many kinds, brass, iron and steel products, including nails, engines and boilers, stoves and ranges, axes and other tools. Lumber milling and woodworking constitute the largest single branch of manufacturing. The value of all manufactures is about $12,000,000 a year.

Other Features of the City. There are many beautiful public buildings, including the courthouse, customhouse, armory, city hall, exhibition building and the public library, a stately structure donated in 1906 by Andrew Carnegie. Many of the private institutions are also noteworthy, especially the Y. M. C. A. building, the general hospital, the Wiggins Institution for orphan boys, and the Good Shepherd Home for girls. Conspicuous among the many fine public school buildings are the High School and the King Edward, Alexandra, Albert and Victoria schools.

Government and History. Saint John was the first city in Canada to adopt the commission form of government; this was in 1912. The common council is composed of the mayor, who is also commissioner of finance and public affairs, and four other commissioners. The charter of 1912 also provides for the initiative and referendum on legislation and for the recall of municipal officials.

On June 24, 1604, three great Frenchmen,—Champlain, De Monts and Poutrincourt—landed at what is now the Market Slip in Saint John. It was the festal day of Saint John the Baptist, for whom the city is named. The French and later the British built forts at the mouth of the river, but it was not until 1783, when 3,000 United Empire Loyalists landed at the same spot where Champlain had moored his ships nearly two centuries before, that the city was really founded. In 1877 a great fire wiped out $22,000,000 worth of property and made 13,000 people homeless. The burnt section was rebuilt at once, and the city has since grown steadily in size and prosperity. H.V.B.

SAINT JOHN RIVER, the principal river of New Brunswick. It was on the twenty-fourth of June, the festal day of John the Baptist, that Champlain and De Monts landed at this river, which they named Saint John. It has its source in a number of small streams which rise on or near the boundary between Quebec and Northwestern Maine. The headwaters of the Saint John are perhaps five miles from those of the Penobscot, which flows south through Maine, and the Chaudière, which flows north into the Saint Lawrence River. The Saint John flows northeast across Maine, and then describes a wide arc, turning first east and then southeast, for eighty miles, forming the boundary between Maine and New Brunswick. After it enters New Brunswick it continues south for about seventy-five miles, and then describes a second wide arc to the southeast, and finally empties into the Bay of Fundy. The river is over 400 miles long and drains an area of 21,500 square miles. The city of Saint John, the commercial metropolis of New Brunswick, is situated at its mouth. Fredericton, the provincial capital, Woodstock and Edmundston are other important places on its banks.

The Saint John is one of the most picturesque rivers in the Maritime Provinces, and like the Hudson River is often called the "Rhine of America." Three miles after it enters New Brunswick it plunges over the Grand Falls, a precipice seventy-five feet high; the falls are about 225 miles from the river's mouth. For nearly a mile below the falls are rapids, in the course of which the river drops another seventy-five feet. The Saint John is navigable for steamers of considerable size from its mouth to Fredericton, a distance of eighty-five miles.

Smaller steamers ascend beyond Fredericton to Woodstock, sixty miles farther, and occasionally, at high water, to the Grand Falls. Above the falls the river is again navigable for forty miles. By the Webster-Ashburton Treaty (which see) navigation is free to citizens of the United States as well as of Canada. The river provides water power for manufacturing and is also an important factor in the lumber industry.

The Reversing Falls. At Saint John, just before the river enters the Bay of Fundy, is the phenomenon known as the Reversing Falls. The river valley contracts into a narrow gorge, in which the river falls seventeen feet. At low tide the river above the gorge is twelve feet higher than the water level in the harbor; then the current is downward. At high tide, however, the harbor level is five feet higher than the river, and the current through the gorge flows upstream. Thus with every turn of the tide the rapids or falls are reversed, and only for a brief period between the ebb and flood can the gorge be passed by steamers. H.V.B.

SAINT JOHNS, the capital city of Newfoundland. It is situated at the southeastern end of the island, on the east, or Atlantic side, of the Avalon peninsula. It is the chief settlement on the island, handles the bulk of the exports and imports for the colony, and is also a manufacturer of nets, ship bread, iron and boots and shoes. Oil refining and tanning are other industries. The chief industries are all connected with the fisheries, including the whale and seal fisheries of the North Atlantic. Population in 1911, 32,292; in 1916, about 35,000.

The city lies for the most part north of a large, landlocked harbor, which is visible for only a short distance from the seaside. The entrance to the harbor, the Narrows, widens from 570 feet, at the narrowest point, to 2,160 feet. On both the north and south sides are hills, which are important features in the fortifications. Around the harbor are docks, wharves, warehouses and a marine railway. Dominating the city is the Roman Catholic cathedral, perched on a hill 225 feet above the sea. There are also an Anglican cathedral and several denominational colleges (Roman Catholic, Anglican, Methodist and Presbyterian). The Parliament buildings, government house, public hospital, courthouse, market house and post office are noteworthy structures.

Saint Johns was founded in 1582 by Sir Humphrey Gilbert. It was captured about a century later (1696) by the French under Iberville, and again during the Seven Years' War, but was finally ceded to Great Britain in 1763. In 1892 a great fire destroyed property to the value of $16,000,000.

SAINT JOHNS, or **SAINT JEAN,** *zhahn,* a town in Quebec, the county town of Saint Johns County. It is situated twenty-seven miles southeast of Montreal, and is on the Richelieu River and the Grand Trunk, Central Vermont, Canadian Pacific and Delaware & Hudson railways. Saint Johns is the junction point of the Central Vermont and Grand Trunk railways, which are operated as a single system. The town has a large lumber and grain trade, and manufactures sewing machines, silks and silk thread, straw hats, umbrellas, furniture, sewer tile and wax tapers. Population in 1911, 5,903; in 1916, about 6,500.

SAINT JOSEPH, Mo., the county seat of Buchanan County, is the third largest city in the state, surpassed only by Saint Louis and Kansas City. It had a population of 77,403 in 1910 and of 85,236 (Federal estimate) in 1916. It is in the northwestern part of the state, on the Missouri River, sixty miles north and west of Kansas City and 300 miles northwest of Saint Louis. Railroad lines entering the city are the Atchison, Topeka & Santa Fe, the Burlington Route, the Chicago Great Western, the Chicago, Rock Island & Pacific, the Missouri Pacific and the Saint Joseph & Grand Island. Electric interurban lines extend to Kansas City and to suburban towns. The area of the city exceeds thirteen square miles.

Saint Joseph is built upon a somewhat hilly site in the center of one of the most productive agricultural sections in the United States. The prominent features are the Federal building, courthouse, $300,000 auditorium, Y. W. C. A. and Y. M. C. A. buildings, the News-Press building, Scottish Rite Cathedral, Masonic Temple, Elks' Club, the First Presbyterian Church, a fine colonial structure, and other churches. Besides the public library, the city has Washington Park and Carnegie Branch libraries. The important hospitals include the state insane, the Saint Joseph, the Ensworth and the Noyes hospitals. Krug Park and Lake Contrary are attractive pleasure resorts. A fine bridge spans the river at this point.

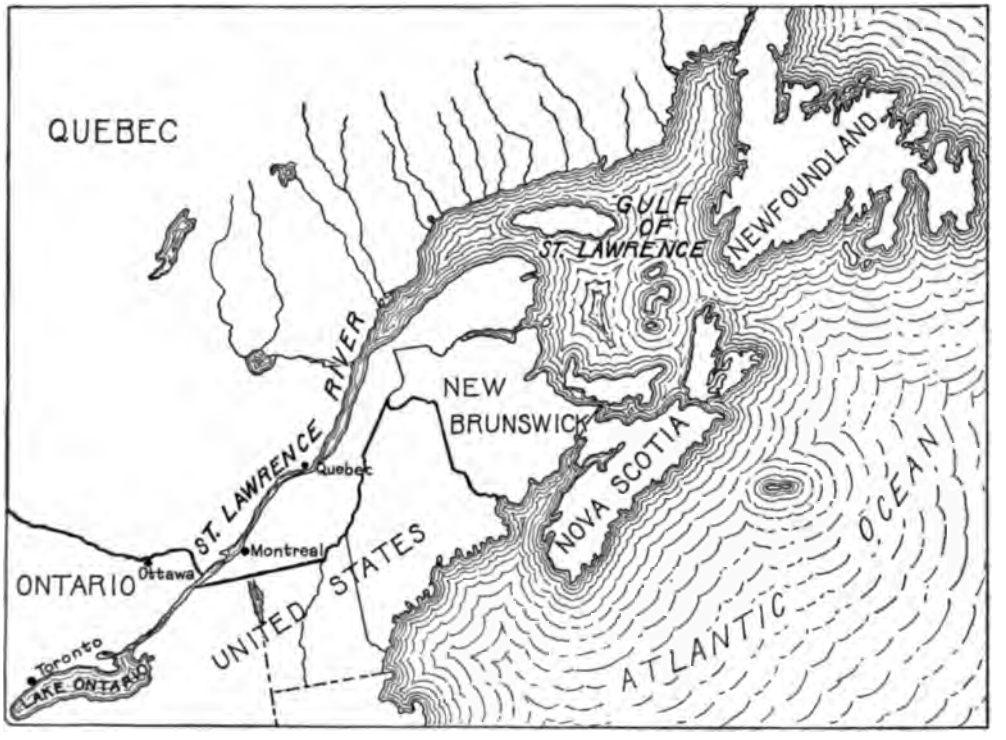
Stockyards and packing plants, the leading industrial establishments of Saint Joseph, give employment to over 4,000 workers and do an annual business worth $66,500,000. There is an important live-stock market for cattle, hogs, sheep, horses and mules, and the city manufac-

tures leather, clothing, confectionery, harness and saddles, boots and shoes. Saint Joseph is a large wholesale center and handles grain, fruits and other farm products from the surrounding territory.

Joseph Robidoux, a fur trader from Saint Louis, established a trading post on the site of Saint Joseph in 1826 and traded with Indian trappers there. He named the settlement, which was incorporated in 1845. It became a city in 1851. The commission plan of government was adopted in 1909. The electric-light plant is owned by the municipality. H.D.E.

SAINT KITTS, *kits.* See SAINT CHRISTOPHER.

SAINT LAM'BERT, a town in Chambly County, Quebec, on the south bank of the Saint Lawrence River opposite Montreal. The river at this point is about a mile and three-quarters wide, but by electric railway the distance to the center of Montreal is about three miles. Saint Lambert is served by the Grand Trunk, the Intercolonial, the Quebec, Montreal & South Shore, the Montreal & Southern Counties, the Central Vermont and the Delaware & Hudson railways. The town possesses about two hundred factories, including the Canadian branch for the manufacture of Waterman's fountain pens, but it is chiefly known as a residential suburb of Montreal. It has a Roman Catholic and a Protestant academy, a convent and several private schools. The town owns its water and sewerage plants, and part of the electric light and power system. From Saint Lambert a magnificent view is obtained of Mount Royal and Montreal. Saint Lambert and the vicinity are usually spoken of as the South Shore. Population in 1911, 3,344; in 1916, estimated, 4,500. J.R.B.



SAINT LAWRENCE RIVER AND GULF

SAINT LAWRENCE, GULF OF, a deep, circular inlet of the Atlantic Ocean. With the exception of the Gulf of Mexico it is the largest gulf on the North American coast. This important body of water is partly enclosed by Newfoundland on the east and Nova Scotia and New Brunswick on the south, and it washes the eastern shores of Quebec (see map, facing page 1096). As the outlet of the Saint Lawrence River and the Great Lakes, the chief highways of trade of Eastern Canada and Northern United States, its commercial importance can scarcely be overestimated. It is the gateway to the great transatlantic trade of Canada and affords the shortest route to Liverpool. By the

way of Belle Isle Strait, between Newfoundland and Quebec, the voyage to Liverpool is 2,633 nautical miles, while from New York it is 3,034 nautical miles. The gulf enters the sea by two other deep channels; these are Cabot Strait, over sixty miles wide and the largest outlet, between Cape Breton and Newfoundland, and Canso Strait, separating Cape Breton and Nova Scotia.

The gulf is crossed by cables, and many steamers ply between Quebec and the Maritime Provinces. The tides are low, but the changing currents, dense fogs and floating ice often endanger shipping. Besides Prince Edward Island in the south and Anticosti Island near the mouth of the Saint Lawrence River, there are several clusters of smaller islands, especially in the southern part of the gulf, and tiny islets fringe the bold and rocky northern shores. The large cod, herring, mackerel and smelt fisheries of the gulf have been the chief means of livelihood to a large part of the population of these islands and the mainland coast.

The gulf and river of Saint Lawrence were discovered by Jacques Cartier. On his second voyage, in 1536, he entered a bay on the north coast of the gulf on the tenth of August, the feast day of Saint Lawrence, and called it the *Bay Sainct Laurens*. This name gradually began to designate the entire gulf and river.

SAINT LAW'RENCE RIVER, a majestic stream which, with its tributaries, drains the basin of the Great Lakes and the southeastern part of Canada. Its basin exceeds 500,000 square miles in area and includes the largest body of fresh water in the world. The Saint Lawrence is the largest river of Canada, and one of the largest rivers of the world; some authorities estimate that in the volume of water discharged it is second only to the Amazon. The river begins at the outlet of Lake Ontario, whence it flows in a northeasterly direction until it enters the Gulf of Saint Lawrence, about 750 miles distant. The original source of this vast river system, however, is the Saint Louis River, which rises in the northeastern part of Minnesota and enters Lake Superior at Duluth. The Saint Mary's River joins Lake Superior to Lake Huron, the Saint Clair and Detroit rivers connect lakes Huron and Erie, and "the waters of Niagara shape the earth" between Erie and Ontario. It has been well said of the Saint Lawrence—

"The Great Lakes are its camping grounds, where its hosts repose under the sun and stars in areas like those of states and kingdoms."

The chief tributaries from the north are the Ottawa, whose dark flood enters the clear waters of the main stream at the island of Montreal; the Saint Maurice, noted for its high falls; the Montmorency, famed for its cascade, and the Saguenay, equaled by no other American river east of the Rocky Mountains in the grandeur of its scenery. From the south the Saint Lawrence receives the Saint Regis, whose sources are in the foothills of the Adirondacks; the Richelieu, the outlet of Lake Champlain; the Chaudière, whose beauty attracts many visitors, and a number of other streams of less importance.

General Description. The average width of the Saint Lawrence from Lake Ontario to Quebec is one and one-fourth miles. In some places it narrows to less than a mile, but in several places there are broad expanses forming "lakes." Lake Saint Francis, thirty miles above Montreal and twenty-eight miles long, and Lake Saint Peter, twenty miles long and about midway between Montreal and Quebec, are the most important of these. Below Quebec the channel begins to broaden into the great estuary that blends with the Gulf at Anticosti Island. Nowhere below the Isle of Orleans is the channel less than ten miles wide. At the Saguenay it has a width of twenty-five miles, and opposite Gaspe the distance from shore to shore is fifty miles.

The Great Lakes are settling basins for the streams flowing into them, and consequently the waters of the Saint Lawrence are remarkably clear and pure. There is an abundant rainfall over the entire basin, but owing to the equalizing effect of the lakes, whose level changes but little during the year, the river is not subject to sudden rises, and disastrous floods along its course, with the exception of occasional overflows in the spring due to the obstruction of the channel by ice, are unknown.

The fall from Lake Ontario to Quebec is 240 feet. Most of this is above Montreal, and between the lake and that city there are a number of rapids, whose total length is about thirty miles. The tide ascends the river as far as the Saint Maurice, where at spring tide the water may rise eighteen feet. The rise at Quebec is twenty-five feet.

From Lake Ontario to Quebec the Saint Lawrence flows through a region of low hills and fertile plains. Its valley is broad and beautiful, with now and then an isolated peak of the Laurentian or the Green mountains to break the monotony of the sky line. The elevation

of the north bank above Quebec terminates in the bold bluff upon which the city is built. Below Quebec the bluffs on the north shore merge into hills, and the hills into mountains which culminate in Cap Tourmente, towering 2,000 feet above the water. Beyond the river the mountains seem to roll into one another until they disappear on the northern horizon. The south shore is low and ascends gradually to a range of low hills in the distance.

The Thousand Islands. For a distance of forty miles after leaving Lake Ontario the river has a width of from four to seven miles, and scattered over this area are about 1,750 islands; some are several acres in extent, while others are mere points of rock. Many of the islands are private property on which wealthy Canadians and Americans have built beautiful summer homes, not a few in the form of medieval castles of most picturesque appearance. The scenery of the islands, with their precipitous rocks and shady groves, is beautiful, and the climate is healthful, offering an almost ideal resort for the summer.

The waters of the Saint Lawrence run swift and clear past the islands, which are near the famous rapids. There are large hotels, which are regularly visited by steamers. Alexandria Bay, the largest town in the park, is a noted summer resort. The islands were formed by a spur of the Laurentian highland, which extends from Ontario southward across the Saint Lawrence River into the state of New York.

The Saint Lawrence Islands Park consists of twelve reservations among the islands, which are set apart as places of outdoor recreation and rest for the public. Pavilions and open-air stoves have been provided for the convenience of campers, and caretakers see that the grounds are kept clean and attractive.

The Rapids. The descent of the river before reaching Montreal is made chiefly by a series of rapids, which are caused by the outcropping of irregular layers of rock in the bed of the stream. The most noted rapids are the Long Sault, the Cedars, the Cascades and the Lachine, just above Montreal. In each rapid the water rushes down a rocky slope and is broken into waves, whirling eddies and masses of spray. Excursion steamers make daily trips from Kingston to Montreal during the summer, and thousands of tourists experience the thrill of "shooting the rapids." Since the boat must pass through a tortuous channel at a terrific speed, the piloting of these steamers requires unusual skill and nerve. But the boats are constructed especially for running the rapids, and accidents are almost unknown. Canals around each of the rapids are used by the boats on the return voyage and also by freight boats in both directions.

Navigation. The largest ocean vessels have always been able to ascend the river to Quebec, and by dredging the shallow places in the channel the river has been made navigable for them as far as Montreal. Steamers from the Great Lakes not drawing over fourteen feet of water make regular trips to Montreal during the open season by using the Welland Canal (which see) and the canals around the rapids. The meeting of ocean and inland traffic at Montreal has made that city the great commercial metropolis of Canada. The Saint Lawrence is not only the great waterway of the Dominion, but also one of the most important commercial routes of the world, and upon its waters are borne the ships of many nations.

History. The Saint Lawrence River was discovered and named by the French explorer, Jacques Cartier, in 1535. The Indians described it as the "river without end." Cartier extended his explorations as far as the island of Montreal, where he found the Indian town of Hochelaga. The broad channel extending westward led him to believe that he had found the much sought passage to China, and it was not until the great inland seas which form its source were discovered by Cartier that the origin of the river was made known. W.F.R.

Consult Johnson's *The Picturesque Saint Lawrence;* S. E. Dawson's *Saint Lawrence, Its Basin and Borderlands.*

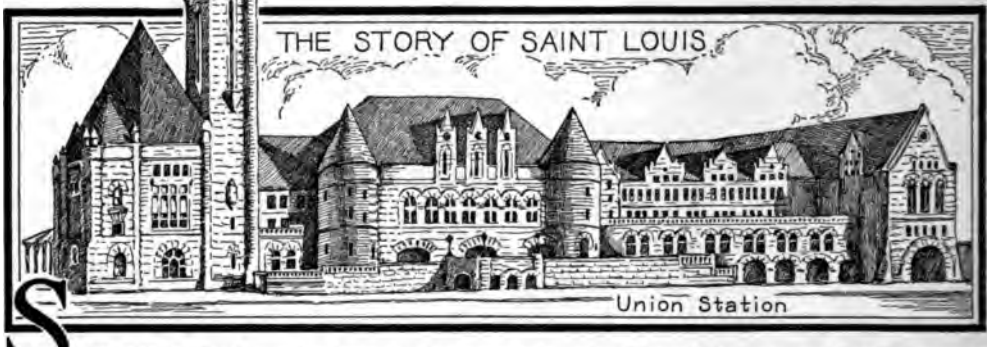
Related Subjects. The reader is referred to the following articles in these volumes:

Cartier, Jacques	Montreal
Great Lakes	Saint Lawrence, Gulf of

SAINT LEGER, *lej'er,* or *sil'in jer,* BARRY (1737-1789), a British soldier who served in the Revolutionary War in America and in the French and Indian Wars. Entering the army in 1756, he was sent to America, served under Abercrombie and under Wolfe at Quebec. In the campaign of 1777 Saint Leger, then lieutenant-colonel, was sent with an expedition to capture Fort Stanwix with the assistance of Sir John Johnson and his Indians, and fought the battle of Oriskany against General Herkimer, who was mortally wounded in the action. A few days later General Benedict Arnold drove Saint Leger's men towards Canada in disorder, and for the rest of the war the latter confined himself to guerilla operations on the border.

Because of Saint approaching altered. The thorities to be rank, but, on the close of the published a

Leger's failure at Oriskany and the flight of his men from Arnold's forces, the British campaign, as planned, had to be materially unfortunate officer was not considered by the British military au- to blame for his failures; he was neither dismissed nor reduced in the contrary, in 1780 he was promoted to the rank of colonel. At war he was commandant of all the British forces in Canada. He *Journal of Occurrences in America*, which recounted his difficulties.



SAINT LOUIS, Mo., the largest city in the vast territory included in the Louisiana Purchase (which see), and the fourth city in the United States in population and in manufacturing. In 1910 it had a population of 687,029; according to a Federal estimate this had increased to 757,309 in 1916. Germans are most numerous in the foreign element.

General Description. Saint Louis is situated on the west bank of the Mississippi River, about twenty miles below the point where it receives the waters of the Missouri. Chicago is about 280 miles northeast, and Kansas City is about the same distance northwest. New Orleans is 709 miles south, and Saint Paul is 599 miles north. Originally the city was built on the high slope rising from the river, but this congested section is now almost wholly commercial, being occupied by wholesale, jobbing and manufacturing houses; the dwellings still remaining have been converted into tenements. An old brick house in this locality of narrow streets and time-worn buildings bears a bronze tablet which tells the passer-by that Eugene Field, the children's poet, was born there in 1850, and near by is the house in which Ulysses S. Grant, eighteenth President of the United States, was married to Julia Dent in 1848.

On Walnut Street, near the river, stands the oldest church in the city, familiarly called the *Old Cathedral;* it is the most notable relic of the French period of the history of Saint Louis. On the crest of this slope stands one of the city's most interesting landmarks, the old courthouse, built in 1839, which was a slave market before the War of Secession. It is built in the form of a Greek cross and contains four large paintings by Wimar and figures representing Law, Commerce, Justice and Liberty.

The newer and greater business district adjoins this old one on the west, and farther on lie fine residential districts, which extend into suburbs of rare beauty. The tendency of the city is to grow westward, and the greater number of the fine residential sections are on the farther West Side; there are, however, some magnificent homes on the North and South sides. More than sixty-one square miles are included in the city's area.

Parks, Homes and Boulevards. Forest Park, the largest of the city's recreation grounds, is an immense tract (1,400 acres) of great natural beauty on which about $3,000,000 has been expended in drives, lakes and landscape gardening. Here in 1904 the Louisiana Purchase Exposition was held. The park contains the Art Museum, the Jefferson Memorial Building, and a "zoo;" its golf links are second to none in the United States. Tower Grove Park, on the South Side, has beautiful drives, and statues of Columbus, Humboldt and Shakespeare. Near the statue of Shakespeare are two trees which were planted by the English actresses, Adelaide Neilson and Olga Nethersole, as tributes to their illustrious countryman. O'Fallon Park, on the North Side, has one of the largest artificial swimming pools in the United States. These three parks, with Carondelet Park, on the extreme South Side, are on a chain of fine boulevards.

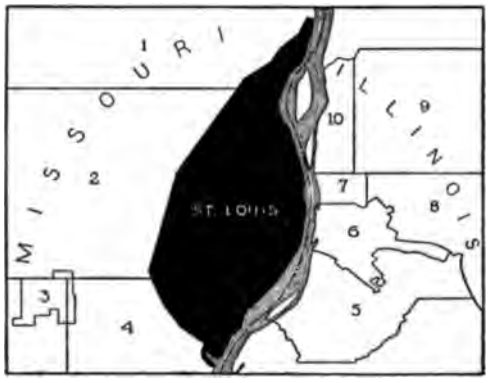
The Missouri Botanical Garden, better known as Shaw's Garden, ranks first in the United States and next to the Kew Gardens, in London, as an educational botanical garden. Its library contains more than 18,500 books, 22,000 pamphlets and a considerable number of manuscript volumes. The Arboretum contains specimens of trees from various parts of the world, and an extensive collection of fruit trees and plants is housed in the Fruiticetum. This garden and Tower Grove Park were the gifts of Henry Shaw, a Saint Louis citizen, who was deeply interested in plants; his burial place in the garden is marked by an imposing sarcophagus. Lafayette, Lyon and Compton Hill Reservoir parks are among the smaller recreation spots and playgrounds. In some one of the parks a concert may be heard any night during the warm season, as Saint Louis is a music-loving community. Bellefontaine and Calvary are the largest and most beautiful of the city's cemeteries; the latter is the burial place of General William Tecumseh Sherman.

No city in the entire Union surpasses Saint Louis in the beauty of its exclusive residential districts, called "places;" the magnificent homes and spacious grounds of these sections are a tribute to the finest skill of the architect and the landscape gardener. Westmoreland, Portland, Kingsbury and Vandeventer are among the most noted of the "places," but Lindell Terrace and Longfellow, Hawthorne, Lindell and Forsyth boulevards rival them in beauty. The huge apartment buildings common to most large cities are noticeably scarce in Saint Louis, detached houses and duplex buildings being the rule.

Reference to the residential parts of Saint Louis can scarcely be made without including the handsome estates and beautiful suburbs adjoining the city on the west, which contain the homes of some of the financiers of the city; besides these, there are attractive suburbs northwest and southwest where large numbers of city workers live. East Saint Louis (Ill.), the "little sister" city, is on the opposite bank of the river. Twelve miles south of Saint Louis is Jefferson Barracks, a United States military post. At the Chain of Rocks, north of the city and on the river, the largest sand filtration plant in the United States was opened in 1915.

Buildings. Among prominent public buildings are the city hall, an imposing $2,000,000 structure in the center of Washington Park; the new municipal building, the Federal building, the main post office, opposite Union Station (the downtown branch being in the Federal building), and the Coliseum, with a seating capacity of 15,000. The new Saint Louis Cathedral, on Lindell Boulevard, is by far the most imposing religious structure; several years will be required to finish the interior marbles and mosaics, and when completed the building will have cost $3,000,000. Saint John's Methodist Episcopal, Pilgrim Congregational, First Christian Science, Second Baptist and Second Presbyterian churches and the Jewish Temple are among the modern handsome churches of the city. Christ Church (Episcopal Cathedral) is an artistic old structure containing some of the finest stone carvings in the United States. Saints Peter and Paul Church is the oldest German Roman Catholic church in the city; it was built in 1848.

The Railway Exchange building, which covers an entire square, is one of the largest office buildings in the world. Union Trust, Frisco, Century, Missouri-Lincoln Trust, Wright and Fullerton buildings, and those of the Bank of



THE METROPOLITAN DISTRICT

1. Saint Ferdinand
2. Central
3. Kirkwood City
4. Carondelet
5. Centerville
6. East Saint Louis
7. Stites
8. Canteen
9. Nameoki
10. Venice

Commerce, Third National and Boatmen's banks are among the conspicuous business structures. The hotels of Saint Louis are sufficient in number and equipment to permit the city to act as host to the largest conventions; the best known are the Stadtler, Jefferson, Planters, Warwick, Maryland, Marquette, Terminal, American and Washington. Saint Louis, University, Racquet, Liederkranz, Columbian, Mercantile and Missouri Athletic are the principal clubs of the city, the last two being in the downtown section. The Women's Club and the Wednesday Club (women's) own their respective handsome quarters. Log Cabin, Saint

Louis, Glen Echo, Florissant, Belle Rive and Sunset Inn are the prominent country clubs.

Education. The public school system of Saint Louis is not excelled by any in the Union, and it is noted for its modern, artistic buildings. There are five high schools for white children and a high school and a normal school for colored pupils. The first permanent kindergarten in connection with the public schools, and the first public kindergarten training school for teachers, were established here in 1873 by W. T. Harris, superintendent of public schools, who later became United States Commissioner of Education. Foremost among the institutions for advanced education is Washington University (founded in 1853 as Eliot Seminary), which includes Smith's Academy and Mary Institute (for girls), and has schools of fine arts, law, social economy and manual training. Saint Louis University was founded in 1829 by the Jesuits, and is the foremost school of this Order in the United States; the Christian Brothers' College, David Ranken School of Mechanic Trades, Kenrick Seminary (Roman Catholic) and Concordia Theological Seminary (Lutheran) are all schools for the higher education of men. Forest Park University, Visitation Academy, Sacred Heart Convent, Loretto Academy and Ursuline Convent are devoted to the education of young women exclusively. The city also has the Missouri School for the Blind, the Saint Louis College of Physicians and Surgeons and a number of law and medical schools. Besides the handsome new public library, which contains more than 415,000 volumes and toward which Andrew Carnegie contributed $1,000,000, there are the Mercantile Library and the libraries of the Missouri Historical Society (housed in the Jefferson Memorial Building), of the Academy of Science and the Medical Society.

Benevolent Institutions. Public charity is provided by the city dispensary, an insane asylum, a poorhouse and a municipal lodging house, and by the industrial school, a reform school for boys and girls. A juvenile court was established in 1903. Barnes Hospital, opened in 1915, is one of the largest and best-equipped institutions of its kind in the United States; it is modeled after the noted Johns Hopkins Hospital in Baltimore. Saint John's, Saint Luke's, Saint Anthony's, Jewish and Saint Ann's Maternity hospitals are the best known of a number of modern, excellently-equipped institutions. Saint Vincent's Asylum, in the vicinity, has a wide reputation for the skilled treatment of the insane.

Commerce. Through its central location and exceptional shipping facilities, Saint Louis has become a foremost commercial center in the greatest agricultural valley in the world. Before the Eads Bridge was built in 1869-1874 (see subhead under EADS, JAMES BUCHANAN), the Mississippi River was the most important factor in the commercial life of the city, and though the growth of railroad construction has caused a decline in water commerce, there is still a considerable trade with cities on the Mississippi River and its tributaries.

Communication with all parts of the country and with Canada and Mexico is afforded by the following railway lines with their connections: the Baltimore & Ohio Southwestern; Chicago, Burlington & Quincy; Chicago & Alton; Chicago & Eastern Illinois; Chicago, Peoria & Saint Louis; Chicago, Rock Island & Pacific; Cleveland, Cincinnati, Chicago & Saint Louis; Columbia & Waterloo; Frisco Lines; Illinois Central; Louisville & Nashville; Louisville, Henderson & Saint Louis; Missouri, Kansas & Texas; Missouri Pacific; Mobile & Ohio; Pennsylvania Lines; Saint Louis, Iron Mountain & Southern; Saint Louis Southwestern; Southern; Toledo, Saint Louis & Western; and Wabash. All railroad trains "back in" to the colossal Union Station, one of the largest unified passenger and freight terminals in the world, which, with its thirty-two tracks, covers eleven acres; trains from the East enter the city over the Eads' and Merchants' bridges. Electric lines communicate with adjacent cities and towns, and the McKinley interurban electric railway, which operates between cities and towns in Illinois, enters Saint Louis over the McKinley Bridge. The Municipal Bridge is in course of erection.

Industry and Manufacture. Saint Louis began its existence as a fur-trading post, and though it has attained a foremost rank in other branches of industry, it has always nurtured the first shoot of its commercial tree, and now is one of the greatest primary fur markets in the world and one of the largest fur-sale markets in the Union. The fur sale held here in January, 1917, was the largest in the history of the United States. The city has one of the greatest horse and mule markets in the world, and an equally important tobacco market. West of New York there is no greater distributing point for dry goods and shoes, and the city holds high rank as a wool and interior cotton market.

Although it is preëminently a distributing and commercial point, it ranks fourth in the

United States as a manufacturing center. Boots and shoes are now the leading manufactured products, having displaced tobacco products, which rank second. One of the largest breweries in the world is located here; its storage capacity is enormous, and its liquors are known in every country. So immense is the business of the great woodenware and hardware houses that private railway tracks are necessary for the handling of their shipments. Saint Louis is noted for its extensive manufacture of railway and street cars, clothing, furniture, baking powder, soap and candles, and the output of its flour mills and gristmills, packing houses, foundries and machine shops is also important.

History. The Saint Louis of to-day is the outgrowth of the fur-trading post established on this site by Auguste Chouteau in 1764. In the same year Pierre Laclede Ligueste, his stepfather, formed a settlement here which was first called Laclede's Village, but which soon after was renamed in honor of Louis IX of France. In 1770 France ceded all of its territory west of the Mississippi River to Spain, and Saint Louis became the capital of Upper Louisiana. One memorable day in April, 1803, the village floated three flags, when Louisiana Territory, which had been transferred by Spain to France, was transferred by France to the United States. The place grew steadily in population and importance, and in 1809 the town was incorporated. The first steamboat to visit the city was the *Pike,* in 1815. In 1819 the western branch of the American Fur Company was established here by John Jacob Astor. About this time large numbers of settlers were coming from Virginia, Tennessee and the Carolinas, and in 1822 a city charter was granted. The year 1849 is memorable for an epidemic of cholera which caused the death of 4,000 people and for a fire which destroyed property valued at several million dollars. During the following ten years the growth of the city was marvelous.

The first railroad (the Missouri Pacific) was constructed from Saint Louis in 1854. The first ironclad gunboats of the United States were built here by Captain James B. Eads in 1861. Under the *Scheme and Charter,* adopted in 1876, the city became independent of county government and taxation. Saint Louis has been repeatedly visited by fire, flood and epidemic, but the greatest calamity in its later history was a tornado, in 1896; it lasted less than twenty minutes, but in that brief time destroyed several hundred lives and swept away $10,000,000 worth of property. The great fair held in

Research Questions on Saint Louis

(An Outline suitable for Saint Louis will be found with the article "City.")

When did the city float three flags in one day, and why?

How many cities in the United States are larger than Saint Louis?

How does it compare in size with the one that ranks next above it? With the one that ranks next below it? See list in article CITY.

What great exposition was held in Saint Louis? Why was there a special fitness in having it in this city?

What well-known poet was born in this city? How is his birthplace marked?

What double disaster did the city endure in 1849?

What might you have seen in the old courthouse at Saint Louis sixty years ago that you would not see to-day?

What was the first settlement on this site named? In whose honor was the city given its present name?

What special advantage would a student of botany have in Saint Louis that he would not find in any other city in the United States?

How does the Union Station in this city rank with the railway stations of the country as to size?

What is Saint Louis's "little sister" city? How is it connected with Saint Louis?

Where may you see two trees planted by English actresses, and in whose honor were they planted?

On what part of the city site was the first settlement made? To what is that region given over to-day?

What President of the United States was married in Saint Louis?

What was his occupation later when he lived in that city?

What is the largest of the recreation grounds of Saint Louis? How does it compare in area with the largest park in Chicago?

What are the exclusive residential districts called?

Why would this city have almost as good a right as has Philadelphia to be called a "city of homes?"

What is the most imposing religious structure in the city?

Where are some of the finest stone carvings in the United States to be seen?

What very important innovations in education were introduced in connection with the Saint Louis schools?

By whom were they introduced? What position did he afterward hold?

What accounted for the early commercial prosperity of the city? Why is this factor no longer of as great importance as it was formerly?

What was the first great industry of Saint Louis?

How does the city rank to-day in this same industry?

What is the popular name for the city, and why was it given?

To how many nations has this region belonged?

When was the first railroad from Saint Louis built? What was it?

What disaster visited the city in 1896? How much damage did it do?

1904 commemorated the acquisition of Louisiana Territory by the United States. In 1914 a great historical pageant was given in Forest Park, and was attended by more than 100,000 people. The spectacular parade and ball of the *Veiled Prophet,* which have been held annually in October since 1878, attract large numbers of visitors to the city. J.D.L.

Consult Spencer's *Story of Old Saint Louis;* Stephens' *Saint Louis, the Fourth City.*

SAINT MARK'S, CATHEDRAL OF, a church in Venice, named from the patron saint of the city, Mark, the apostle. The first church on the site was built in the ninth century, when the supposed remains of the apostle were brought to Venice, but this structure was destroyed by fire, and in the tenth century a second was built. Originally this second church was a simple structure, in plan, like the modern one, a Greek cross. Gradually alterations were made and ornamentation was added, until it became what it is to-day—one of the most gorgeously beautiful buildings in the world. In the days of the republic of Venice there existed a law compelling every merchant who journeyed to the Orient to carry back something to adorn the sacred edifice; and the building as it stands is practically a museum of art.

The church faces the Square of Saint Mark's. In form, as stated above, it is a cross, 250 feet from east to west, 170 feet in greatest width; over the center there is a dome forty-two feet in diameter, and over each arm a smaller dome. In part the style of architecture is Byzantine, and the little cupolas resemble the minarets of a mosque. Five porches which open upon the Square of Saint Mark lead to five doors, over the central one of which are set four colossal horses of bronze which were brought from Constantinople in 1204.

Within the church, the decoration consists chiefly of mosaics, set in a gilded background. The vaults of the ceilings are comparatively low, and these mosaics, with their exquisite color schemes, are easily seen. The chancel screen is crowned with marble statues of Mary, Saint Mark and the Twelve Apostles, and various statues of marble or of bronze decorate other parts of the church. At certain seasons there is displayed the wonderful altar screen, accounted one of the most beautiful pieces of gold and silver work in the world. It contains hundreds of precious stones.

Previous to 1807 Saint Mark's was merely the royal chapel, but since that date it has been the cathedral of Venice.

Consult Ruskin's *Stones of Venice;* Goodyear's *Architectural Refinements of Saint Marks at Venice.*

SAINT MARYS, a town in Perth County, Ontario. It is on the Thames River, and on the Grand Trunk and Canadian Pacific railways, twenty-one miles north of London, and ninety-nine miles by rail southwest of Toronto. Saint Marys lies in an agricultural district, and its principal factories produce agricultural implements, dried fruits, butter and cream. There are large stone quarries in the neighborhood. Population in 1911, 3,388; in 1916, about 3,700.

SAINT MARY'S RIVER, the stream which carries the surplus waters of Lake Superior into Lake Huron. It is about forty miles long, and forms a part of the boundary between Ontario and the Upper Michigan peninsula. A number of islands divide it into two main channels, each of which expands into several lake-like bays. Near the upper end of the river are the Saint Mary's Rapids, where there is a fall of nearly twenty feet within a mile. To avoid these rapids canals have been constructed, both on the Canadian and American sides. Though sometimes called the Saint Mary's Canals, these are better known as the Sault Sainte Marie Canals (which see). The rapids furnish power for manufacturing and are crossed by a railway bridge a mile long.

SAINT MAURICE, *mawr'is,* **RIVER,** a river of Canada, lying entirely within the province of Quebec. It rises in a chain of little lakes near the southern part of the province, flows for 300 miles in a generally southeasterly direction, and empties into the Saint Lawrence at the city of Three Rivers. For about twenty miles above its mouth it is navigable, but at that point navigation is interrupted by a waterfall 160 feet in height. Above the falls there is a stretch of seventy-five miles navigable for small boats. The scenery along the entire course, and especially in the falls region, is beautiful, and the stream is important as the means of transportation for the logs cut in the forests about its source.

SAINT MORITZ, *mo'rits,* a famous resort and watering place in Switzerland, 6,037 feet above sea level. It lies in the upper part of the great valley known as the Engadine, and is the highest village in the valley. Its permanent population is less than 1,700, but both in summer and in winter this is largely increased by the health-seekers and tourists. In the summer the visitors come from many parts of Europe and America to benefit from the

famous baths which lie about a mile south of the village. It was Paracelsus, the noted physician, who late in the sixteenth century called attention to these baths, and their fame has steadily increased. In the winter come the English, for it is not the water cure that attracts them, but the remarkable facilities for skating and tobogganing which the region affords, sports which cannot be indulged in at home. At all seasons the views from this elevated site are superb, and these are added attractions to draw visitors.

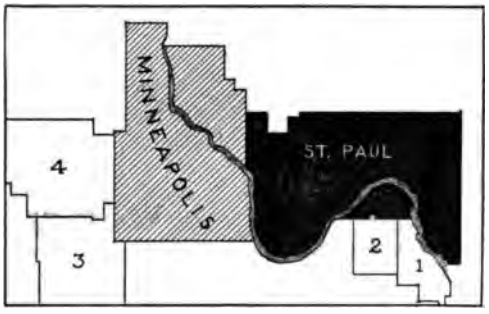
SAINT PAUL, MINN., the capital of the state and the county seat of Ramsey County, a foremost live-stock, manufacturing and jobbing center, and the United States army headquarters for the entire Northwest. It is in the southern part of the state, 400 miles northwest of Chicago, 152 miles southwest of Duluth and 1,829 miles east of Seattle. Adjoining the city on the west is Minneapolis, the state metropolis, the two being popularly known as the "Twin Cities." The Mississippi River, flowing southward through the upper part of Minneapolis and defining the southeast boundary of that city and the southwest boundary of Saint Paul, bends north and again south in two great, easy curves, along which Saint Paul is situated. Railroads entering the city are the Burlington Route, the Chicago Great Western, the Chicago, Milwaukee & Saint Paul, the Chicago, Saint Paul, Minneapolis & Omaha, the Chicago, Rock Island & Pacific, the Great Northern, the Minneapolis & Saint Louis, the Minneapolis, Saint Paul and Sault Sainte Marie, the Northern Pacific and the Chicago & North Western. The city is the center of several electric lines and there is considerable excursion traffic on the river. The population was 214,744 in 1910; in 1916 it was 247,232 (Federal estimate).

Situation and Parks. Saint Paul occupies an area of more than fifty-two square miles, on a site which rises eastward in terraces extending 266 feet above the level of the river. Summit Avenue, 200 feet wide, running north and south along the highest elevation, is the principal residence street, and it offers magnificent views of the river valley and surrounding country. On this avenue are the fine residence of the late James J. Hill and the homes of other capitalists. About 1,500 acres of the city are parked. Como Park, on the north side, which contains a large lake, is a wooded tract of natural beauty made still more lovely by landscape gardening. Rice Park, a fine square in the business portion of the city, is surrounded by some of the principal public buildings. Phalen Park, on the northeast, Fort Snelling, on the southwest (a military reservation at the junction of the Mississippi and Minnesota rivers), and Indian Mounds Park, along the Mississippi at the east end of the city, are all parts of the extensive park system. On an island midstream in the Mississippi, opposite the business section of the city, is another fine park, with free public baths and a zoölogical garden. Two large bridges cross the river at this point.

Public Buildings. The business section of the city extends along the second curve of the river. Here the dominating feature is the magnificent state capitol, a building designed by the architect Cass Gilbert. The exterior is beautified by sculptures executed by Daniel Chester French and Edward C. Potter, and the story of the state's history has been told in mural paintings by many artists, among whom are John La Farge, Edwin H. Blashfield, Kenyon Cox and Howard Pyle. The structure is built of white marble and native granite, and it cost $4,500,000.

Other prominent public buildings are the combined city hall and courthouse, which, with the sections of parking about it, occupies an entire block; a fine city Auditorium, a $1,000,000 public library, the Hill Reference Library,

the Federal building and a United States customhouse. Among a number of beautiful places of worship are the Cathedral (Roman Catholic), conspicuous because of its huge copper dome, and the People's, Park Congregational, Central Presbyterian and First Baptist churches. Commercial, religious, secret order, social and athletic organizations own and oc-



THE METROPOLITAN DISTRICT

1. South Saint Paul City
2. West Saint Paul City
3. Edina Village
4. Saint Louis Park Village

cupy club houses throughout the city. Willow Brook, one of the best-equipped state fish hatcheries in the United States, is east of Indian Mounds Park.

Institutions. The libraries and museums of Saint Paul include the public library; the library of the State Historical Society and the state law library, both housed in the capitol; the Public Art Gallery and Scientific Museum, both a part of the Saint Paul Institute, housed in the Auditorium; the Art Collection of the Minnesota State Art Society, in the Old Capitol; and a private art gallery, part of the estate of James J. Hill, containing what is considered the finest collection of the works of the Barbizon school in America. Educational advantages are offered by Concordia College (German-Lutheran), Hamline University (Methodist), Macalester College (Presbyterian), Saint Paul College of Law, Saint Thomas College (Catholic) and the state agricultural college, a part of the University of Minnesota, the main buildings of which are in Minneapolis (see MINNESOTA, UNIVERSITY OF). The state fair is an important exhibition held annually on grounds adjoining the city on the northwest.

The principal hospitals and charitable institutions are the city and county, Saint Joseph's, Saint Luke's and Swedish hospitals, the Scandinavian Orphan Asylum, Home for the Friendless, Magdalen Home and the Women's Christian Home.

Industry. Saint Paul contains some of the largest wholesale houses and the largest individual horse market in the United States, while its annual trade in cattle approximates $40,000,000. As a center of the manufacture of shoes, grass carpets, refrigerators, machinery, beer and fur goods, and as a publishing center, it holds a foremost place among American cities. Its varied industries represent a total capitalization of $80,000,000, and their annual output is valued at $75,526,000. The city is the port of entry for the Minnesota customs district, receiving imports sent by rail from Canada and the Orient. Imported teas are inspected here. At South Saint Paul are large stockyards and packing houses, and the city has long been an important market for furs from the Northwest. A new industry, that of the cultivation of mushrooms in caves along the river, is reaching considerable dimensions. Saint Paul is an important transfer point both for freight and passengers, and the erection of a passenger sta-

THE ROMAN CATHOLIC CATHEDRAL

tion and terminals to cost $10,000,000 was begun in 1917 to accommodate the heavy traffic. In the city are the main offices and shops of the Great Northern, the Northern Pacific and the Chicago, Saint Paul, Minneapolis & Omaha roads.

History. Father Louis Hennepin visited the site of Saint Paul as early as 1680. Traders and trappers passed over the site at infrequent intervals, and Jonathan Carver came there from Connecticut in 1766. In 1805 Lieutenant Zebulon M. Pike was sent to explore the territory acquired under the Treaty of Paris, and at this place he made a treaty with the

Sioux, obtaining from them the grant of land where Fort Snelling was built ten years later. A scattering settlement was made about the fort, and in 1841 Father Lucian Galtier and Father A. Ravoux built a small log chapel on the corner of the present Third and Minnesota streets and dedicated it to Saint Paul. The place became known as Paul's Landing and then as Saint Paul.

When Minnesota became a territory in 1849 Saint Paul was incorporated as a village and was made the territorial capital, and continued as the state capital when, in 1858, Minnesota was admitted to the Union. It had become a city in 1854. In 1914 the commission plan of government was adopted. The water supply of the city is obtained from several lakes to the north, and the mains which draw the water, which were constructed at a cost of $8,000,000, are owned and operated by the municipality. An excellent sewerage system and adequate supervision of food and public health, together with the supply of pure water, have combined to make Saint Paul one of the most healthful cities in the country. J.C.V.H.

Consult Andrews' *History of Saint Paul.*

SAINT PAUL DE LOANDA, *lo ahn'dah,* also called LOANDA, was the first settlement of the Portuguese in West Africa (1576), and is now the capital and chief city of the colony of Angola (which see). For two centuries it was the center of slave trade between Portuguese West Africa and Brazil, and at present is the center of more than one-half the trade of Angola. The chief exports are rubber, coffee, hides and ivory. The harbor entrance is obstructed by a sandbar, and large vessels unload their freight into lighters. Population in 1913, estimated to be 25,500. About 1,800 Europeans live here.

SAINT PETERSBURG, *pe'terz berg,* the name by which PETROGRAD, the capital of Russia, was known prior to the autumn of 1914, soon after the outbreak of the War of the Nations. See PETROGRAD.

SAINT PETERSBURG, FLA., in Pinellas County, is a popular winter and summer resort on the west-central coast of Florida. It is twenty-one miles southwest of Tampa, on the east coast of the peninsula which separates Tampa Bay from the Gulf of Mexico, and is served by the Atlantic Coast Line and the Tampa & Gulf Coast railroads. The city has a fine beach and harbor, recreation pier and bathing pool, a Federal building, Carnegie Library, city hospital, hotels, churches and private residences. The principal occupations are fishing, trucking and the raising and marketing of citrus fruits. The resident population in 1910 was 4,127; this is greatly increased during a few months each year by the tourist population. In 1913 the commission plan of government was adopted. A.N.

SAINT PETER'S CHURCH, the largest and most imposing Christian church in the world, is situated in Rome. The approach to it is through an open space, the Piazza di San Pietro, which is elliptical in form, covers several acres and is surrounded by colonnades, or covered driveways. In the center of this piazza stands a red granite obelisk eighty feet in height, which was brought from Egypt in the days of Caligula, but was not erected here until the sixteenth century, when the church was in process of construction.

The building of Saint Peter's was a slow process. Constantine the Great built a basilica on the site and dedicated it to Saint Peter, and all through the Middle Ages this was preserved. In the fourteenth century it showed signs of decay, however, and plans were made for rebuilding. Not until the sixteenth century was the structure begun, and then the plans were entirely changed. Bramante, the first architect employed, designed the building in the form of a Greek cross with a dome, and although the architects who succeeded him made changes, Michelangelo, who took charge of the work in 1546, followed more nearly the original plan. During the eighteen years that the work was in his hands great progress was made, and the smallest details of the great cupola were worked out, so that the architects who came after him had little difficulty in completing his designs. One important change was made in the plans by an architect who took charge early in the seventeenth century—a change for the worse. Of the original Greek cross he made a Latin cross, with the long arm in front; and this huge extension hides the dome of the building unless the spectator is a full half mile away. Not until 1626 was the building finished and dedicated.

Within, the proportions are such as to be almost startling. The length is 613 feet, the width eighty-seven feet, and the dome rises to a height of over 400 feet. About the walls there are altars, chapels, tombs and innumerable works of art; while beneath the center of the dome rises the high altar, at which only the Pope or a specially authorized cardinal may officiate; and above this towers the great bronze canopy, ninety-five feet in height. The total

cost of the building is estimated at about $50,000,000, and over $30,000 are spent each year in caring for it and keeping it in repair. There was considerable difficulty in raising the vast sum needed to complete the building.

Consult Barnes' *Saint Peter in Rome and His Tomb on the Vatican Hill.*

SAINT-PIERRE, *saN pyair'*, a French island colony, forty-seven miles off the south coast of Newfoundland, with a total area of ninety-three square miles. Saint-Pierre, Miquelon and Ileaux-Chiens comprise the whole colony, which is administered by a governor and represented in the French chamber by a deputy; it represents all that remains to France of its once enormous possessions in North America.

The islands are chiefly important as the center of the French cod fisheries, which employ about one-half of the inhabitants. Saint-Pierre, the capital, has steamboat communication with Halifax and Boston, and cable connection with America and Europe. After changing ownership several times, the islands were finally returned to France in 1816.

SAINT-PIERRE, JACQUES HENRI BERNARDIN DE (1737-1814), a French critic and novelist, famous as the author of the novel, *Paul and Virginia,* was born at Havre. He was educated for the profession of civil engineer, and between 1761 and 1765 traveled through Germany and Russia and did sufficient work in his profession to keep him from starvation. He next served as a government officer on the Isle of France, or Mauritius, but his whole interest in life was the study of nature, and he resigned the position after three years.

His first book, *A Voyage to the Isle of France,* appeared in 1773, in Paris, and was simply and charmingly written and full of reverence and sympathy. Rousseau, who believed but little in religion, admired the work for its naturalness, and the powerful Bishop of Aix, who was certainly the opposite of Rousseau, admired it for its reverence. The Bishop procured Saint-Pierre a yearly pension of two hundred dollars from the French Government, and with this income, the author set about the pleasant task of writing his *Studies of Nature.* In 1779 he wrote as a supplement to this work his famous *Paul and Virginia,* recognized as one of the great masterpieces of descriptive fiction. The plot, dealing with the childhood of a boy and a girl in an ideal park or woodland, is very light, but the sentiment, the vivid descriptions and the tone of innocence and purity make the story one of the most touching in all literature. The book had much influence in shaping French fiction in simple and natural style, and has been translated into the language of every civilized nation.

SAINT-QUENTIN, *saN kahN taN'*, a manufacturing town in Northern France, in the department of Aisne, situated about eighty-seven miles northeast of Paris, on the Somme River. It was the scene of two famous battles: the first was fought in 1557 between allied Spanish and English troops and the French, the latter being defeated; the other occurred on January 19, 1871, when the town was captured by the Germans. The town is in the battle zone of the War of the Nations, which set Europe aflame in 1914. One of the finest Gothic cathedrals of France, built in the twelfth century, is located at Saint-Quentin. Population, 1911, 55,570.

The Saint-Quentin Canal, one of the main arteries of trade in Northeastern France, in territory held by the Germans in the War of the Nations, was partly wrecked by the invaders in August, 1917. It is seventy-five miles long, and unites the Seine and Somme rivers.

SAINT-SAËNS, *saN sahN'*, [CHARLES] CAMILLE (1835-), a French composer, was born in Paris. He began the study of music almost as early as his first lessons in reading and writing, and at the age of seven was taking advanced piano instruction. Five years later he was allowed to enter the Conservatory of Paris and before he was sixteen years old had won both the first and the second prize in organ playing. He was scarcely eighteen when he received the important position of organist in the Church of Saint-Merri, Paris, and in 1861 was granted one of the most responsible musical offices in all Europe, that of organist in the Madeleine Church of Paris.

In 1863 the Society of Saint Cecilia of Bordeaux gave his overture, *Spartacus,* first honors, and in 1867 the authorities of the International Exhibition at Paris awarded him the prize for his cantata, *Noces.* These honors, together with deserved fame as a pianist, came to him before his thirty-second birthday, but it was not until 1872 that Saint-Saëns was able to have an opera accepted. Even then this first effort, *The Princess,* was not successful, and others that followed it met with little favor. In 1877, his Biblical opera, *Samson and Delilah,* was produced at Weimar, and its popularity has steadily increased from that first appearance. But Saint-Saëns will always be better known for his beautiful symphonic poems,

such as *La danse macabre* and *Phaéton,* and his graceful, brief compositions for the piano.

SAINT-SIMON, *saN se mawN',* CLAUDE HENRI, Count de (1760-1825), a noted French socialist, born in Paris and educated under the direction of D'Alembert. He took part in the Revolutionary War in America, doing good service in the campaign against Cornwallis. During the French Revolution he approved of the abolition of titles, and though he took no active part in any of the movements, was imprisoned for a time. His ambition from youth up was to do something to benefit mankind, and after the Revolution, with the aid of the fortune which he had amassed by buying and selling the estates of the émigrés, he set about experimenting as to the exact form his uplift movement should take. He lost all his money, and until his death was supported by a pension allowed him by his family. His doctrines met with but a cold reception at first, but before he died had won a few enthusiastic converts, among whom was Auguste Comte.

Saint-Simon stood for the necessity of a complete reorganization of society, with industry as its basis and science as its guiding principle. Every one, in his ideal state, should be obliged to work, and each should receive rewards commensurate with his labor. Especially was the law of inheritance to be abolished. The disciples of Saint-Simon elaborated his teachings into the socialistic system known as Saint-Simonianism. Among the works in which his ideas were set forth are *Reorganization of European Society, Industry, The Industrial System* and *New Christianity.*

SAINT SOPHIA, *so fe'a,* the most important and imposing structure of Constantinople, is one of the oldest buildings in Europe and the largest Mohammedan mosque in the world. The present structure was erected as a Christian church by the Roman Emperor Justinian the Great, who brought it to completion in 538. It is related that Justinian was so impressed by its splendor that he exclaimed, "O Solomon, I have surpassed thee." The building is a rectangle and its exterior is disappointing, but its beautiful interior makes it architecturally one of the wonders of the world. (An interior view of the structure is shown on page 325, in the article ARCHITECTURE.)

The interior, 250 feet from east to west and 235 feet from north to south, is divided by two piers and eight columns into a nave and aisles. Over the center of this great hall of worship rises the dome, the most impressive feature and crowning glory of the structure. The dome is 180 feet high and 107 feet in diameter, and is supported on four arches, each having a span of nearly 100 feet. The arches rest upon eight porphyry columns arranged in pairs at the four corners of the nave. In the base of the dome are forty-six arched windows, through which the edifice is lighted. From the cornice of the dome a half dome extends east and west, and this in turn rests on three smaller and lower half domes which extend to the entrance. Thus the great central hall of worship is completely covered by a dome-shaped roof which "swells larger and larger and mounts higher and higher, as though a miniature heaven rose overhead."

The Roman Empire was searched to find columns, alabasters and precious ornaments for this magnificent temple. The walls are lined with marbles of various hues, arranged in beautiful designs. The vaulting is set with glass mosaic of the finest Byzantine workmanship. On the capitals of many of the columns are monograms of Justinian and the Empress Theodora.

In 1453 the Turks captured Constantinople and converted the Church of Saint Sophia into a Mohammedan mosque. Every Christian emblem was torn from the walls or covered with whitewash, and minarets were erected at each of the four corners. Nevertheless, even with so much of its glory obscured, the interior of Saint Sophia produces upon the observer an effect unequaled by that of any other building in the world.

SAINT STEPHEN, *ste'ven,* a town in Charlotte County, New Brunswick, in the southwest corner of the province. It is at the head of tidewater on the Saint Croix River, which here forms the boundary between the United States and Canada. Saint Stephen is one of four adjacent towns at this point, the other three being Milltown, N. B., Milltown, Me., and Calais, Me. These four communities have their public utilities in common; a single street railway system, gas and electric systems and waterworks serve all four. The four fire departments respond to alarms on both sides of the river. The population of these four towns is about 15,000. Population of Saint Stephen in 1911, 2,836; in 1916, about 3,200.

The town is served by the Canadian Pacific and New Brunswick Southern railways, and at Milltown, Me., two miles away, has connection with the Main Central Railway. The Saint Croix River carries a large traffic in lumber, fish, coal and general merchandise. Saint Stephen is not merely a distributing point, but a

manufacturing center, and at least two of its products, confectionery and soap, are advertised everywhere in Canada. Lumber, tools, fertilizer and shoes are the other manufactures of importance. Milltown, N. B., adjoining Saint Stephen, is noted for its production of fine colored cotton goods. F.P.G.

SAINT THOMAS, a city in Ontario, the county town of Elgin County. It is one of the most important railway centers in Southern Ontario, being almost equally distant from Toronto and Detroit. It is served by the Canadian Pacific, Grand Trunk, Pere Marquette, Wabash and Michigan Central railways. By rail Saint Thomas is 119 miles southwest of Hamilton, 123 miles west of Buffalo, and 121 miles southwest of Toronto. As a division point on most of the railroads which enter it, its chief industrial establishments are railroad shops. Its manufactures are worth over $4,000,000 to $5,000,000 a year. The courthouse, collegiate institute and the public hospital are noteworthy buildings. Population in 1911, 14,054; in 1916, estimated, 16,500.

SAINT THOMAS, an island in the former Danish West Indies, now named Virgin Islands of the United States, thirty-six miles east of Porto Rico. Saint Thomas is of chief interest because of its location. Situated as it is in the path of ocean liners, it has become a coaling station of great importance, a fact that was recognized by the United States when in 1917 it purchased the entire group of Danish islands (see VIRGIN ISLANDS OF THE UNITED STATES).

Saint Thomas has an area of thirty-three square miles. The island has commercially declined since the abolition of slavery, labor being hard to obtain for the sugar plantations. The principal product has been rum, but demand for this is on the decline. The climate is hot, and earthquakes are frequent. The capital and chief town is Charlotte Amalie. In 1911 the population, consisting chiefly of the descendants of freed slaves, was 10,678.

SAINT VIN'CENT, a mountainous island in the British West Indies, a part of the Windward Colony, has an area of 133 square miles, half of which is still covered with forests. The valleys are fertile, although eruptions of the volcano Soufrière have twice devastated considerable portions of the island. Until 1796 it was the stronghold of the warlike West Indian Caribs, who still hold a small reservation.

The climate is healthful, with an abundant tropical rainfall. The chief products are arrowroot, cocoa, cotton, fruits and spices. Since the abolition of slavery, labor has been so hard to obtain that the sugar industry has steadily declined, a fact also true of neighboring islands in the archipelago. The capital is Kingstown, a picturesque town with a population of 4,574; the total population of the island is 44,600, mostly negroes, descendants of freed slaves.

SAINT VI'TUS'S DANCE, or CHOREA, *ko re'a,* a nervous disease that most commonly attacks children between the ages of five and fifteen, especially girls. It is characterized by muscular jerkings of the face, neck, arms, hands, and various other parts of the body, and may be brought on by overstudy, worry, lack of outdoor exercise, late hours, fright and shock. The exciting agent is a germ or toxin that affects the brain and spinal cord, and the disorder is frequently associated with diseased tonsils or rheumatism. While Saint Vitus's dance in its ordinary form is seldom fatal, an attack may last from six weeks to six months, and the disease tends to recur if proper precautions are not taken. Rest, nutritious food, relief from worry or mental exertion and cold baths are among the hygienic measures used in combating the disorder. Physicians also prescribe tonics. Any child afflicted with Saint Vitus's dance should be taken out of school (see EDUCATION, subhead *Saint Vitus's Dance,* page 1947).

The term *chorea* is derived from a Greek word meaning *dance;* the other and more common name has come into use through associating the disease with a form of hysteria which prevailed in Central Europe in the sixteenth century, cures for which were sought at the shrines of Saint Vitus.

SAKHALIN, *sa Ka lyeen',* an island off the southeastern coast of Siberia. The part north of 50° belonged to Russia until December, 1914, the southern part to Japan. During the progress of the War of the Nations Russia ceded its northern portion to the latter country, giving Japan ownership of the entire island.

It is divided from the Maritime Province by the Strait of Tartary, about five miles wide, and the Strait of La Pérouse separates it from Yezo, the most northerly island of Japan. The island covers an area of 27,823 square miles, and has a mountainous surface. Of the geological formation little is known, but there are extensive coal fields, some of which are mined. Timber of good quality is exported.

The climate is not suited to agriculture, and there is very little land under cultivation. The fisheries provide the chief occupation and the

food of the inhabitants. Fur-bearing ani- are numerous and valuable. Russians yet n the north, and are mostly convicts and the island having become a Russian settlement in 1869. The total population mated at 56,450. The chief towns are Dui, vskoie, Korsakova and Muravievski. See facing page 417.

LABERRY-DE-VALLEYFIELD, *sal' a 'eh val'i feeld,* popularly known as VAL- LD, a city in Beauharnois County, Quebec. at the foot of Lake Saint Francis, which xpansion of the Saint Lawrence River, and western terminus of the Beauharnois Ca- which steamers avoid the rapids or "Cas- " The city is served by the Grand Trunk New York Central railways, and is eighty- miles by rail east of Ottawa and forty- miles southwest of Montreal. Population 1, 9,449; in 1916, estimated, 11,000.

leyfield is noted chiefly for its manufac- ; its largest establishment, a cotton mill, ys nearly one-half the total population. large mills and factories produce paper, e powder, flour and cigars. Situated as it two trunk lines of railway as well as the st navigable waterway in Canada, the also producing abundant water power, yfield has advantages for manufactures. city owns its aqueduct and street-lighting , but power is furnished by private com- s.

e city is the seat of a Roman Catholic p, and the magnificent $500,000 cathedral most conspicuous building. Also note- y are the post office and customhouse, leted in 1908 at a cost of $150,000, and ourthouse, which cost about $75,000. A al school, a classical college and two mies, one French and one English, are in- d in the city's educational institutions. yfield was settled in 1874, and was incor- ed as a city in 1904. L.J.B.

L'ADIN (1137-1193), a powerful sultan of t and Syria, who rose from a soldier of hepherd tribe of the Koords to be vizier caliph. On the caliph's death he usurped hrone and greatly widened his borders by

His capture of Jerusalem, in 1187, d consternation throughout the Christian , giving rise to the Third Crusade (see ADES). Saladin was compelled to surren- he stronghold of Acre to the crusading s, in 1191. For two years they contended him for the tomb of Jesus, but without r success than the securing of a truce of three years, during which time pilgrims should be allowed to enter Jerusalem. The armies then withdrew. The next year Saladin died, and his empire rapidly weakened under the rule of his jealous and intriguing successors.

SAL'AMANDER, a small animal belonging to the same class as the frog, toad and newt (see AMPHIBIANS). Salamanders and newts form one order of amphibians, differing from frogs and toads in their possession of a tail (see NEWT). The body of a salamander is elongated, resembling that of the lizard in general form, and there are four sprawling legs. One of the best known species is the *spotted salamander* of Central and Southern Europe, so called because of its conspicuous black and yellow markings. It is from six to eight inches long and has a smooth, shiny skin, covered with glands and pores from which exudes a sticky substance believed to be poisonous. The animal is found in moist places in forests and mountains, and feeds on snails, worms and insects. A common American species, found both in Mexico and the United States, and often seen in aquariums, is the *axolotl,* a salamander with a velvety black skin. Some species live in dark caves far below the earth's surface, and are blind and have white skins.

Salamanders breed in the water. The young are sometimes brought forth alive and sometimes hatch from eggs laid in the water. The young tadpoles breathe by external gills, which are retained for a considerable time. The young of the axolotl sometimes breed while tadpoles, and in rare cases this immature stage lasts for years. The *giant salamander* of China and Japan lives entirely in the water and has both lungs and gills in the adult stage.

SAL'AMIS, an island of horseshoe shape, belonging to Greece, situated in the Gulf of

LOCATION MAP
Salamis and its geographical relation to Athens.

Aegina, off the coast of Attica, and due west from Athens. It is barren, rocky and mountainous, covering an area of thirty-six square miles, with a population of about 4,600. The

valleys yield a little grain, olives and grapes. The commercial importance of Salamis is very slight, but its ancient history is interesting and notable. The narrow strait between the northeast of the island and the coast of Attica was the theater of a desperate and decisive naval battle between the Greeks and Persians, 480 B. C., the Persians, although superior in numbers and size of vessels, being completely routed, over 200 out of about 750 vessels of Xerxes being destroyed. The valiant Greeks had only 375 triremes in the battle. See ATHENS.

SAL AMMONIAC, *sal a mo'ni ack,* a compound of chlorine and ammonia, the chemical name being *ammonium chloride.* It is prepared in large quantities by distilling the liquor of gas works, which contains a large proportion of ammonia. In its crude form sal ammoniac is a dirty white solid, but when purified it forms fibrous white crystals. Crude sal ammoniac is employed extensively in charging Le Clanché batteries (see ELECTRIC BATTERY), for cleaning surfaces to be soldered, in the manufacture of galvanized iron and in the textile industries. In a pure state it is used as a remedy for bronchitis, pneumonia and some stomach disorders. It dissolves readily in water, to which it imparts a salty taste.

SAL'ARIES OF RULERS. See CIVIL LIST.

SALARY, *sal'ar i,* **GRAB,** in United States history, the popular name of an act passed by Congress in 1873, which provided that certain increases in salary previously granted Senators and Representatives were to date from 1871. The general indignation aroused by this specimen of back-pay legislation caused the repeal of the act, and the next year the salaries of the Congressmen were reduced to the original figures—from $10,000 to $5,000 for Senators and from $7,500 to $5,000 for Representatives. The act grew out of the agitation for larger salaries for United States officials. When Congress raised the salaries of its own members it increased also the compensation of several other officers; the President's salary was raised from $25,000 a year to $50,000; that of the Chief Justice from $8,500 to $10,500, and those of the Vice-President, Associate Justices and Speaker of the House from $8,000 to $10,000. By the final act all of these salaries were reduced to the original figures except those of the President and Justices.

SALAYER, or **SALEYER,** *sah li'er,* **ISLANDS,** a group of islands in the Dutch East Indies, with an area of 270 square miles. They are of coral formation, covered with a wonderfully fertile soil, and the large forests c valuable timber. The island of Salayer occupies 250 square miles, the remainder group being mere islets. The inhabitant number about 80,000, are chiefly Malay bracing the Mohammedan religion, thei occupation being fishing and making trep

The island exports tobacco, indigo, and potatoes, and is noted for its br horses. Salayer is in frequent communi by steamer with Celebes. Native chie the islands, subject to the Dutch governn

SALE, BILL OF. See BILL OF SALE.

SA'LEM, MASS., one of the two count of Essex County, situated in the northe part of the state, seventeen miles northe Boston, on a peninsula formed by two of the Atlantic Ocean, the South River a North River. The latter separates it fro erly. Salem is a city of many interestir toric and literary associations. It wa original settlement of the Bay Colony, a birthplace of Nathaniel Hawthorne. Th is served by the Boston & Maine Railro by electric interurban lines. The popu was 43,697 in 1910, and 47,200 (state cens 1915. On June 25, 1914, the city was pa destroyed by fire; the property loss ex $12,000,000, and about 15,000 people were homeless. The area of Salem exceeds square miles.

Special Features. Throughout the c period Salem was a place of importanc until about 1860 had an extensive foreign with Europe, Africa, China and India. museum of the Peabody Academy of S which was founded in 1867 by a gift of $1 from George Peabody, contains many in ing relics of the South Seas, Japan ar East Indies and of the merchants and chantmen connected with the early com Other interesting features of Salem a Essex Institute, occupying several bu and containing a valuable library, his relics of New England and a number paintings; the Athenaeum with its excell brary; and many fine old dwellings datin the Colonial period. Among the latter a house where Hawthorne was born, the House and the House of the Seven Gabl built in the second half of the seventeent tury.

Buildings and Parks. Salem has the ol tomhouse (completed in 1819) in which thorne worked as surveyor of the port 1845 to 1849, three courthouses, a city h

armory and a public library established by the bequest of Captain John Bertram. The charitable and beneficent institutions include the almshouse, hospitals and asylums, and homes for the aged. The parked areas of the city comprise about 400 acres and include Washington Square, or the Common, in the center of the town, and Gallows Hill, Highland, Mack, the Willows and Forest River parks.

Industry. The principal industries of Salem are the manufacture of boots and shoes, leather, foundry and machine-shop products, brass, bronze and copper products and printing and publishing. The products of all industries have a total annual value of about $13,450,000. Salem is an important reshipping port for coal.

History. Salem, originally called Naumkeag, was founded in 1626 by Roger Conant and his associates, and was the first settlement in Massachusetts after Plymouth. In 1628 John Endicott arrived with another group of settlers and a charter under which he organized the town. Roger Williams, a close friend of Endicott's, was pastor of the Congregational Church from 1634 to 1635. Perhaps Salem is best known as the scene of the witchcraft delusion, which raged in 1692 (see WITCHCRAFT). In 1774 the First Provincial Assembly of Massachusetts met in Salem, and declared the independence of the colony. Salem became a city in 1835. Among its many distinguished citizens have been Alexander Graham Bell, Joseph E. Worcester, dictionary-maker, and Judge Joseph Story. It is also the native city of W. H. Prescott, the historian. V.T.S.

Consult Powell's *Historic Towns of New England;* Bates' *Old Salem.*

SALEM, OHIO, the center of a rich coal-mining district in Columbiana County, in the northeastern part of the state, thirteen miles southeast of Alliance and twenty-eight miles southwest of Youngstown. It is connected with both of these cities by interurban lines, and is on the Pennsylvania Company Railroad. In 1910 the population was 8,943; in 1916 it was 9,799 (Federal estimate). The area exceeds three square miles. Salem has a Federal building, a Carnegie Library, a fine high school building and a public hospital. The principal manufactures include steel, engines, motor boats and automobile bodies, rubber tires, pumps, nails, bath fixtures, china and gum. The place was settled in 1807, incorporated as a village in 1830 and became a city in 1887. Before the War of Secession it was a station of the Underground Railway. C.W.U.

SALEM, ORE., the capital of the state and the county seat of Marion County, situated in the northwestern section of the state, on the Willamette River, twenty-seven miles north of Albany and fifty-one miles southwest of Portland. Transportation is provided by the Southern Pacific and the Salem Falls City & Western railroads and by the Oregon Electric, and there is regular steamer connection with Portland. The place was settled by Methodist missionaries from Massachusetts in 1846, and it is supposed they named it for the city of Salem, in their home state. It was incorporated as a city in 1853, and became the state capital in 1860. Salem is the second city in the state in population, ranking next to Portland. The population increased from 14,094 in 1910 to 20,278 (Federal estimate) in 1916. The area is six square miles.

This attractive city, with fine, well-shaded streets, is built on ground which slopes gently from the river. Overlooking the city is the massive state capitol, whose high dome may be seen for a great distance. Among other handsome structures are the Federal building, Supreme Court building, city hall, the state institutions for the blind and the deaf mutes, the penitentiary, the reform school and the hospital for the feeble-minded. The state fair grounds are also located here. In addition to the public schools, the city has Willamette University (Methodist Episcopal), originally founded as an Indian school but opened as a university in 1844; the Academy of the Sacred Heart, the Capital Business College, Kraps Normal School, a Carnegie Library and the state library, with 103,000 volumes. At Chemawa, in the vicinity, there is an industrial training school for Indians. Salem is the trade center for the fertile Willamette Valley, a section having a large yield of fruit, hops and wheat. There are three loganberry-juice plants here, and large fruit and hop driers, fruit-packing establishments and flour, lumber and woolen mills. R.A.G.

SALIC, *sal'ik,* **LAW,** a term applied to a law in force in any country rendering it illegal for a woman to occupy the throne. This interpretation was based on the clause of the Barbarian Laws of the Salian or Merovingian Franks, which declared that "of Salic land no portion of the inheritance shall come to a woman." When this was drawn up, about A. D. 486, there was no reference to the throne in the law, and its first application as a pretext for keeping a woman or her heirs off the throne appears to have occurred in France during the struggle between Philip VI and Edward III of England

(1312-1377). The English king claimed the right to the crown in descent from his mother Isabella, daughter of Philip IV (the Fair), king of France. His claim was repudiated as coming from a woman, and the law preventing women or their heirs from occupying the throne became known as the Salic Law.

In 1714 Philip V introduced this law into Spain, but it was revoked by Philip VII in 1830. The question as to whether, while being barred from succession, a woman may transmit her rights to her descendants is a vexed question, which besides embroiling France and England in the fourteenth century was the cause of the War of the Austrian Succession in the eighteenth century (see SUCCESSION WARS).

SALICYLIC ACID, *sal i sil'ik as'id,* a compound of carbon, hydrogen and oxygen found in the buds of spiraea (meadowsweet), wintergreen, birch and some chemical substances. When pure it occurs in fine, white, needlelike crystals. It has a sweetish acid taste, is sparingly soluble in cold water, but dissolves readily in hot water.

Salicylic acid is a powerful antiseptic, a small quantity being sufficient to preserve most animal and vegetable substances. Until its use was forbidden by the government in 1904 it was extensively employed in preserving meat, eggs, other articles of food, and beer. Extensive investigations showed that its continuous use, even in small quantities, was injurious to the system; hence the prohibition of its use as a preservative.

Salicylic acid is employed in the arts for strengthening glue, preserving hides, and, in combination with other substances, in the manufacture of yellow, orange and purple dyes. Some of its compounds are used in medicine.

SALINA, *sa li'na,* KAN., the county seat of Saline County, is an industrial center northeast of the center of the state, 100 miles west and south of Topeka. It is served by the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, the Missouri Pacific and the Union Pacific railroads. The population, which was 9,688 in 1910, was reported to be 10,488 by the state census of 1915. The area is more than three square miles. Salina is the seat of Kansas Wesleyan University (Methodist Episcopal), and has Saint John's Military School, Saint John's and Saint Barnabas hospitals, a Carnegie Library, a Federal building, courthouse, city hall, Y. M. C. A. building and Oak Dale Park (forty-one acres). Salina has important wholesale interests in groceries, hardware, agricultural implements and other lines, and a good horse market; the chief manufactures are flour, carriages, confectionery, rugs, mattresses and foundry products.

SALISBURY, *sawlz'ber i,* ROBERT ARTHUR TALBOT GASCOYNE-CECIL, Marquis of (1830-1903), a distinguished English statesman, born at Hatfield in Hertfordshire and educated at Eton and at Christ Church, Oxford. After his graduation he traveled for a time, and in 1853 was elected to Parliament from Stamford. Before 1860 it came to be recognized that he was a decided addition to the ranks of the Conservatives, and as early as 1865 he began to be looked upon as one of the foremost politicians of England. In the latter year he became Lord Cranborne, by the death of his brother, and a year later entered the Cabinet as Secretary of State for India, but the Cabinet split in 1867 over a reform bill, and Cranborne resigned. In 1868, on the death of his father, he became third Marquis of Salisbury and took his place in the House of Lords.

Between 1869 and 1873 Salisbury was leader of the Opposition, but in 1874 he took his place as Secretary of State for India in the newly-organized Cabinet of Disraeli. He attended the conference at Constantinople in 1876, the object of which was to obtain from Turkey promises of administrative reform, but was not able to obtain Turkish consent to the British recommendations. In 1878 he became Secretary of State for Foreign Affairs, and it was largely his influence which brought about the Congress of Berlin, which he attended with his chief, Disraeli. The Conservatives went out of office in 1880, and in 1881, on the death of Beaconsfield, Salisbury became leader of the Conservative party. Not until 1885 was he again in office, but this time it was as Premier. Before anything had been accomplished the Conservatives were defeated in a general election and Gladstone became Prime Minister, but Salisbury was returned to office in 1886. Save for the years between 1892 and 1895, he remained at the head of the government until 1902.

Although during all his life he had little sympathy with the masses of the people, official confidence in him steadily increased, and was justified by his unwavering, if cautious, patriotism and by the outstanding position which he acquired among the diplomats of Europe. His great interest lay in foreign affairs, and his policy was one of peace. In 1895 a break with the United States on the Venezuelan question threatened, but Salisbury man-

aged to maintain peace in the face of difficulties. One of the chief events of his administration was the agreement with Germany in 1890 by which the British and German spheres of influence in Africa were marked out. The conduct of the South African War, during Salisbury's administration, was largely in the hands of Joseph Chamberlain, the colonial secretary. Salisbury resigned in 1902, being succeeded in the Premiership by his nephew, Arthur Balfour. A.MC C.

Consult Aitkin's *The Marquis of Salisbury;* How's *Marquis of Salisbury.*

SALIVA, *sa li' va,* a watery fluid secreted by glands in the mouth, which mixes with mucus poured out by the membrane lining the mouth and helps digest the food. (For details of the work of saliva in digestion see MASTICATION; DIGESTION, subhead *The Mouth.*) Saliva serves also to keep the mouth moist, a very important factor in our physical comfort. There is scarcely anyone who has not experienced the discomfort of a dry mouth brought on by "stage fright" or shock of some sort; this is because the secretion of the fluid is temporarily stopped by nervousness.

Formerly, in the East Indies, persons accused of crime were compelled to swallow parched rice to prove their innocence. If guilty, the accused would believe that he could not swallow the rice, and his fear tended to check the action of the salivary glands and actually did prevent his swallowing the grain. The falsely accused, on the contrary, would be conscious of his innocence, and his glands would work normally. As the act of chewing tends to stimulate the secretion of saliva, some physicians advise people to chew gum for ten or fifteen minutes after a meal, for the fluid when swallowed promotes digestion in the stomach by stimulating the gastric glands. See STOMACH.

SALLUST, *sal' ust* (86-34 B.C.), a Roman historian of plebeian origin. He served as quaestor about 59 B.C., and in 52 as tribune of the people. When the Civil War broke out he took the side of Caesar, whom in 47 he accompanied on his African campaign. At its close he was appointed proconsul of Numidia, and while in this office he made himself very unpopular by his extortions. Returning to Rome with a great fortune gathered by these oppressions, he withdrew from public life and devoted his time to writing. Of his *Historiarum Libri Quinque* there remain only fragments, but the accounts of the conspiracy of Catiline and the war against Jugurtha are extant, and form the first Roman examples of what is in modern times known as history.

SALMON, *sam' un,* a large fish, living both in fresh and salt water, which belongs to the same family as the trout and the whitefish. All are immensely valuable commercially. There are nearly a hundred species of salmon, but only half a dozen of them are well known to the general public. Nearly all of them live in the ocean, but some species possess one peculiar characteristic which has long been known and never has been explained. Those that live in salt water regularly enter the fresh water of rivers to spawn, while some species that live in rivers journey to the sea to spawn. Other species that live in lakes enter running brooks at spawning time.

Because they possess traits which belong to no other fish salmon have been objects of a great deal of study. It is known that the marine salmon remains in fresh water for nearly its first two years. It then weighs but a few ounces, and following its hereditary trait it finds it way to the sea, where the next two or three years are spent. Here it grows rapidly, but probably does not travel more than twenty to forty miles from the mouth of the river in which its life began. Of its life in the sea little is known.

THE SALMON

A minor poet named Drayton thus describes the extraordinary ascent of waterfalls by this fish:

Here when the labouring fish does at the foot arrive,
And finds that by his strength but vainly he doth strive,
His tail takes in his teeth, and bending like a bow
That's to the compass drawn, aloft himself doth throw:
Then springing at his height, as doth a little wand,
That, bended end to end, and flerted from the hand,
Far off itself doth cast, so does the salmon vaut.
And if at first he fail, his second somersaut
He instantly assays: and from his nimble ring,
Still yarking never leaves, until himself he fling
Above the streamful top of the surrounded heap.

In the spring, after its fourth year, as soon as waters begin to warm, the salmon again makes its way up the river. It is now a large, strong, gamy fish, and the persistence with which it fights its way upstream in the face of

obstacles commands the admiration of observers. It advances against swift rapids, ascends small cataracts with ease and may be seen to leap almost perpendicularly upward over falls a dozen feet high. Sometimes a number of attempts to accomplish this latter feat are unsuccessful, but it persists until at last it lands in the waters above or finds the task too great for its strength. The occasional salmon defeated in its efforts to surmount a cataract dies within a few days.

The journey upstream proceeds, sometimes for hundreds of miles, at the rate of two to four miles per day, and then spawning time, October or November, has arrived. The female pours forth countless numbers of eggs, into a nest from one to four feet deep which the male has dug in the gravelly bed of the stream. After spawning, the parent pair float downstream, tails foremost. They make no effort to swim, nor to reach the sea. Within a few days—ten days, at the most—both males and females die.

Not until the following April or May do the baby salmon emerge from the eggs deposited in the nest by the parent fish. They are less than an inch in length, and for weeks each is nourished only by a yolk sac, suspended beneath the body. Gradually the sac is absorbed into the body of the little fish. When it ventures on its journey to the sea, after a period of nearly, if not quite, two years, it is but a few inches in length.

Flesh of the Salmon. People who eat canned salmon delight in the conventional orange color of the flesh, and they often assume that healthy salmon have no other color. This is not true, for at different times during a year the tint varies from creamy-white to deep orange. There is no difference in the taste of the varying shades of flesh, but it has been discovered that only the orange tints will be accepted in the markets, especially for canning. The best commercial fish are those taken in the spring, as a rule, for some species are "white-meated" in the fall. The flesh may vary in a single individual; near the head it may be dark, gradually becoming lighter towards the tail, or there may be alternate dark and light streaks running the length of the body.

Salmon Fishery. The two principal species on the Pacific coast are beyond a doubt the most valuable food fishes in the world, far exceeding the herring and the cod. These are called the quinnat, Chinook or king salmon, and the blueback, also known as the red salmon or coho. At almost all seasons they can be taken in nets; the heaviest run begins in early March, when the salmon are about to start on the long journey to the spawning grounds, and continues without much decrease until nearly spawning time. In some rivers the run is greatest in late summer and early fall. The Columbia River catch is largely the quinnat; in Puget Sound, the blueback; in Alaskan waters both species are plentiful. The total catch on the Pacific shores and in tributary rivers is worth more than $20,000,000 a year, mostly quinnats and bluebacks. Other species which are also sought are the silver, dog, and humpback salmon.

The quinnat, or Chinook, salmon, weighs, on an average, nearly twenty-five pounds, although specimens weighing nearly a hundred pounds are not rare. The bluebacks are about a third as large, their average weight being from seven to eight pounds. The silver salmon weighs from three to seven pounds; the dog salmon, about nine pounds. The quinnat's body in the spring is silvery, the back has round, black spots, and the head has a metallic luster; the bluebacks are a bright blue above and silvery below; the silver salmon is greenish above, with a few faintly-marked black spots on the back; the dog salmon is a dull silver color in the spring, but it turns to a dirty red tint in the fall.

E.D.F.

Consult Malloch's *Life History and Habits of the Salmon, Sea Trout and Other Freshwater Fish;* Jordan's *Fishes.*

SALMON TROUT, a European species of trout, which is found in salt water but ascends fresh-water streams at spawning time. It is intermediate in structure between the trout and salmon, and, like these, is of great value as a food fish. The same name is also applied to an American species of trout known more commonly as the *steelhead.* It is found quite generally in streams of the Pacific coast from the southern part of California to Alaska, and is especially abundant in the lower courses of the Columbia River. The steelhead averages from five to eight pounds in weight, though large specimens reach a weight of twenty pounds. Great numbers are caught in the Columbia and are canned or sold fresh. Because of the value of the steelhead as a food fish it is being propagated by the United States Fish Commission, and it has been introduced successfully in Lake Superior. See SALMON; TROUT.

SALOL, *sal'ohl,* or *sal'ol,* a white crystalline powder composed of salicylic acid (which see)

and phenol. It is odorless and almost tasteless. It does not dissolve in water, but dissolves readily in alcohol or ether. Salol is employed in medicine as a remedy for rheumatism, neuralgia and such intestinal diseases as cholera and jaundice. Combined with phenacetin it forms *aspirin*, which is extensively used to relieve pain.

SALON, *sa lawN'*, THE PARIS, a world-famous exhibition of the works of living artists, held every year at the two Palaces of the Fine Arts, in Paris, from May 1 to June 22. The exhibits consist of oil and water color paintings, sculptured figures, engravings, pastels and etchings. The prizes, consisting of medals and the coveted Prize of Rome (Prix de Rome), are awarded by a jury selected by ballot by the exhibitors, who are organized under the name Society of French Artists. The same jury decides which works are worthy of exhibition, and so all pieces entered are subjected to two tests. In 1889 there was considerable dissatisfaction over the awards, and a new society was organized (National Society of Fine Arts) which holds an independent Salon from May 15 to July 15 in the Champ de Mars (Field of Mars). It is known as the New Salon, as distinguished from the original, or Old, Salon.

SALONIKI, *sah lo ne' ke*, a Greek seaport on the Gulf of Saloniki, an arm of the Aegean Sea. It is a picturesque and ancient city, with white houses surrounded by white walls, clustering elms and cypresses and mulberry trees, broad streets paved with lava, and with the slender minarets and towers of its mosques piercing the sky line. Its harbor is ample and is protected by a great breakwater, and the city has railroad connections with all Greek cities and with the Balkan states at the north.

But the most interesting thing about Saloniki is its turbulent history. Ever since it was founded in 315 B.C., it has been the scene of successive invasions, conquests and massacres by hostile peoples from the north and the west, the south and the east, and has been, at one time or another, under the rule of practically every adjacent country and nation. In 904 it was invaded by the Saracens and 22,000 of its inhabitants were sold into slavery. In 1430, in spite of the most desperate resistance, it was taken for the fourth time by the Turks and was held by them until 1912, when it was recaptured by the Greeks.

As a neutral port and the shipping center for the entire Balkan peninsula, Saloniki entered on a period of prosperity when it fell to the Greeks, such as it had never known before. In the fall of 1915 it became necessary, however, as a part of their plan of campaign, for the allies to make a strong demonstration in Greece against the Germanic powers, which had invaded and conquered Serbia and Montenegro. Accordingly, the allies blockaded the port of Saloniki, accumulated enormous stores of food in the city, and converted it into an impregnable fortress, stationing there the army which had taken part in the campaign against the Dardanelles. In 1916, after King Constantine had refused to give moral support to the allied cause, Premier Venizelos and his forces set up a provisional government in the city. On the downfall of the king, in June, 1917, this provisional government was merged with the legal government of united Greece, and Saloniki returned to normal conditions. On August 20, of the same year, a great fire destroyed much of the business section and rendered nearly 60,000 people homeless. It was planned to rebuild at once. Population, 1913, about 160,000.

SAL'SIFY. See OYSTER PLANT.

SALT. As a seasoner and preserver of food salt has been used from earliest times in nearly all parts of the world, and the value placed upon it is closely associated with man's advance from savage and nomadic conditions of life to those of a higher civilization.

Chemically, salt is *chloride of sodium,* that is, a compound of chlorine and sodium; in mineralogy it is known as *halite.* The sources of supply are the oceans and salt lakes, salt mines and brine springs.

Sea Salt. At one time almost all of the common salt of commerce was produced by the evaporation of sea water, and considerable quantities are still obtained in this way from San Francisco Bay, Great Salt Lake and the waters along the seaboard countries of Southern Europe. Portugal produces over 250,000 tons annually, and France between 250,000 and 300,000 tons each year. The "Salzgarten" of Austria, which are rectangular basins surrounded by sea walls, where the sea water clarifies, settles and evaporates, annually produce between 70,000 and 100,000 tons of sea salt.

Since there are about three-eighths of a pound of salt in each gallon of sea water, it has been estimated that the entire ocean if dried up would yield about 4,419,300 cubic miles of rock salt, about fourteen and one-half times the bulk of the entire continent of Europe, mountains and all. Of the larger seas, the waters of the Mediterranean and Caribbean

contain the greatest quantities of salt, but the smaller, enclosed seas, such as the Dead, Black, Red and Caspian, and Great Salt Lake, contain an even greater proportion.

Rock Salt. The greater part of the world's supply of salt is now produced from rock salt, extensive deposits of which occur in America in the Canadian province of Ontario and in the states of Michigan, New York, Ohio, Kansas,

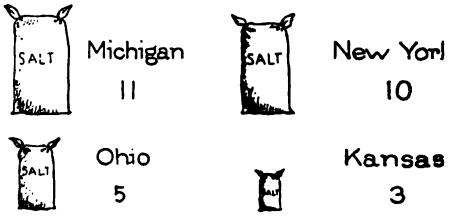
LOUISIANA ROCK SALT MINE
Drawn from a photograph taken 600 feet underground in a mine of solid rock salt.

California and Louisiana. Smaller quantities are found in many other states as well, in all degrees of purity, from a salty clay to pure, transparent crystals. In Nevada, extending twenty-five miles along the Virgin River, there is a saline bluff over sixty per cent of which is salt of a high grade. A deposit covering 144 acres occurs on Avery's Island, near New Iberia, La. The deep shaft mine near Detroit, Mich., produces more than any other in the country, and its supply seems inexhaustible.

The production of the United States has shown a steady increase, and tends more and more to supply the entire demand of the country, though the salt from the West Indies and Mediterranean countries is a competitor with New York salt for the trade of the Atlantic coast. The annual marketed product o United States, including the salt of Porto now exceeds 34,000,000 barrels, or more 4,800,000 short tons, valued at over $10,2 Michigan, with an annual output of more 11,600,000 barrels, ranks first, and New (over 10,000,000 barrels) is second. B consuming most of its output, the count nually imports over 900,000 barrels.

The richest fields in Europe are the pathian mines in Austria, where the v chambers and massive pillars of salt thirty miles; in the lower levels of the there are streets and houses for the Some of the largest salt mines in the wor at Wieliczka, near Cracow (which see). are large deposits also in Western Ger Russia, Switzerland, France, Spain and Britain. These salt deposits often occur there are petroleum, bitumen and inflam gas, and at a remarkable salt spring in the escaping gas serves as fuel for the ev tion of the salt brine.

Rock salt is extracted by mining, by e rating the water of natural brine springs by evaporating artificial brine. This lat



PRODUCTION IN AN AVERAGE YE
Only those states are named which repor 3,000,000 barrels of salt in a year. (From U States Government reports.)

produced by forcing water into salt bed dissolving the salt; the brine is then pu to the surface and evaporated in the ope or by artificial heat.

Uses. There are various grades of known as table, dairy, common, fine, pac solar, etc. Salt is used in the largest quar as a seasoner of food, but it is also emp in the packing and preserving of meat and in the manufacture of soda ash, sodium bonate and caustic soda; for hardening s in the glazing of coarse pottery and ir proving the clearness of glass. It is a fertilizer because it attracts and holds moi and sets free the inert plant food in the It is a necessary part of the food of cattle wild animals obtain it from salt licks or sp

which they often travel great distances to find.

Historical. When cereal and vegetable foods began to be used, salt became a necessity, and since it was difficult to obtain, it naturally acquired a religious significance. A salt spring was regarded by inland peoples as a special gift from the gods, and ancient Roman historians tell us that the German tribes fought for the possession of salt streams, believing that their presence gave the region a peculiar sanctity. Salt was used by the ancient Hebrews and other Semitic peoples and by the Greeks and Romans in their offerings, probably as a symbol of purity. The "covenant of salt" mentioned in the Old Testament was one which could not be broken, as salt symbolized perpetuity. Christ spoke of His disciples as "the salt of the earth" with reference to their spiritual influence on the world.

Among the Orientals of the present day, as in the past, salt used at a meal is representative of friendship and hospitality; hence the Arab phrases, "there is salt between us," signifying friendship; "to eat of a man's salt," or to partake of his hospitality; "to sit above the salt," or in the place of distinction. In Persia a man who is said to be "untrue to salt" is accused of disloyalty.

As the chief religious and economic necessities of the ancient world, salt and incense were of great importance in developing the earliest highways of commerce. The salt of Palmyra and Tadmore built up the vast trade between the Syrian ports and the Persian Gulf; the great salt mines of Northern India were the center of a wide trade before the time of Alexander the Great; a caravan route united the salt oases of the Libyan desert, and to the present day the traffic in salt forms a large part of the caravan trade of the Sahara. There was also an ancient salt trade between Aegean ports and the coasts of Southern Russia, and one of Italy's oldest roads, the *Via Salaria,* is the route by which the salt of Ostia was carried up into the Sabine country. Cakes of salt were anciently used as money in parts of Abyssinia and Tibet, and salt taxes existed even in ancient and medieval times, C.H.H.

Consult Ries's *Economic Geology;* also annual bulletins of the United States Geological Survey.

SALT LAKE CITY, UTAH, the capital and the largest city of the state, the county seat of Salt Lake County, and the principal city between Denver, 741 miles southeast, and San Francisco, 920 miles southwest. The population, which was 92,777 in 1910, had increased to 117,399 (Federal estimate) in 1916. Nearly half of the present population is of the Mormon faith, and the city is known world-wide as the headquarters of that religious sect. The city is served by the Denver & Rio Grande, the Oregon Short Line, the San Pedro, Los Angeles & Salt Lake, the Western Pacific and the Salt Lake & Los Angeles railroads, and by several electric interurban lines. It occupies an area of forty-eight square miles.

Salt Lake is situated west of the north-central part of the state in a beautiful valley at the western base of the Wasatch Mountains, and is twelve miles southeast of Great Salt Lake. The altitude is 4,300 feet above sea level. Although pioneers found this valley almost barren, by irrigation they made it one of the most productive agricultural sections of the West. Trees, among them many Lombardy poplars, were set out by the first settlers, and the rich vegetation now seen adds much to the city's attractiveness. The streets are unusually wide (132 feet) and are regularly laid out.

Saltair Beach, about eighteen miles from the city, is a famous bathing resort on Great Salt Lake. Three miles east is Fort Douglas, a United States military reservation. Bingham, "where copper is king," is twenty-five miles southwest, and is reached by means of a scenic line of railway. Here is a mountain of copper ore, 1,600 feet high, from which 24,000 tons of ore are hauled each day.

Special Features. Near the center of the city is Temple Square, a ten-acre tract which contains the famous Mormon Temple, Tabernacle and Assembly Hall. The Temple is a massive granite structure, and in it the sacred rites and ceremonies of the Church are performed. None are admitted within the building but members of the Church. Its construction extended over a period of forty years, from 1853 to 1893, and it cost $4,000,000. The floor plan is rectangular, 186 feet long and 99 feet wide, and the structure is 107 feet high. At both ends are towers, two of them rising 157 feet each. The tabernacle is an elliptical, one-story building, whose unusual features are its great arched roof, unsupported except by the walls, and a famous pipe organ.

Among other buildings associated with the life of the Church are the Lion House, the residence of the wives of Brigham Young; Amelia House, the home of the prophet's favorite wife; the new administration building, which is a memorial to Brigham Young; and the building occupied by Zion's Coöperative Mer-

cantile Institution. The state capitol, completed in 1915 at a cost of $2,000,000, occupies a prominent position on a hill in the northern part of the city. Other noteworthy structures are the Federal building, the city and county building, the Utah and New House hotels, Salt Lake Theater, Holy Cross, Deseret and Saint Mark's hospitals, Saint Mary's Cathedral (Roman Catholic), the Union and Denver & Rio Grande depots, fine office buildings, banks, churches and schools.

Institutions and Parks. Salt Lake City is the seat of the University of Utah, which occupies a splendid site in the eastern part of the city. It has also a state normal school, All Hallow College (Roman Catholic), Gordon Academy (Congregational), the Latter Day Saints' University, Rowland Hall (Protestant Episcopal) and the Salt Lake Collegiate Institute (Presbyterian). Here also is located the state penitentiary. Among the largest parks are Liberty (100 acres), Pioneer, Majestic and Wandamere.

Industries. Salt Lake City is an important commercial city, the supply center of a vast mining, agricultural and stock-raising country. Its largest industrial establishments are smelters and mineral mills, iron works, marble works, sugar factories, canning establishments, flour mills, woolen mills and manufactories of shoes, crackers, cereals, chocolate and candy, salt, pickles and soap. The value of manufactured products averages $35,000,000 a year.

History. Under the leadership and guidance of Brigham Young, a party of Mormons arrived in the valley of the Great Salt Lake on the 24th of July, 1847. The city was organized in 1851 and was called Great Salt Lake City until 1868. The commission form of government was adopted in 1912. The water system has always been owned by the city. Salt Lake City is the birthplace of the stage favorite, Maude Adams. S.H.C.

Consult Powell's *Historic Towns of the Western States;* Fohlin's *Salt Lake City, Past and Present.*

SALTON, *sawl'ton,* **SEA,** a temporary lake formed in the southeastern part of California, chiefly in Imperial County, between the Santa Rosa and Chocolate mountains. Its basin is about 500 square miles in area and is between 200 and 300 feet below sea level, and is believed at one time to have been covered by waters from the Gulf of California, which have since receded. However this may be, this low area is now separated from the gulf by a broad, fertile ridge, at the top of which the Colorado River flows. Early in the twentieth century a company of American capitalists began extensive irrigation operations in this territory, and excavated a channel to conduct water from the Colorado to the Imperial Valley. In 1905 and in 1906 the river flooded the valley through the canal, emptying great quantities of water into the basin. It took many millions of dollars to repair damages to property and to guide the river back to its course. Subsequently the sea disappeared through evaporation.

SALTPE'TER, or NI'TER, a compound of potassium and nitric acid, which bears a close resemblance to common salt in its outward appearance. In chemistry it is known as *potassium nitrate.* Saltpeter is found native in the earth in some localities in Spain, Egypt and India, and in caverns in Kentucky and Tennessee. Large quantities were prepared from earth in Mammoth Cave during the War of 1812. A part of the supply for use in the arts is obtained from these natural sources, but a much larger part is made by treating sodium nitrate with potassium chloride.

Saltpeter crystallizes in six-sided prisms. It dissolves readily in water, to which it imparts a salty taste. It is a mild antiseptic, and small quantities are sometimes put into brine employed in preserving meat. Its most extensive use in the arts is in the manufacture of gunpowder (which see). It is also employed in the manufacture of fireworks and matches. It is valuable as a flux in smelting certain ores, and is employed so some extent in dyeing.

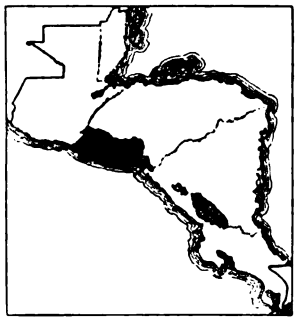
Chile Saltpeter is a nitrate of sodium which obtains its name from the fact that extensive beds of it are found in Northern Chile and Bolivia. It is also called *soda saltpeter.* It is extensively employed in the manufacture of saltpeter and as a fertilizer. Antofagasta is the port from which most of it is shipped.

SALTS, a name given to saline laxatives generally. The more important are *Epsom salts,* or magnesium sulphate, *Glauber's salt,* or sodium sulphate, and *Rochelle salts,* or sodium and potassium tartrate. They produce copious bowel movements and have the common property of drawing off water from the blood. In cases of emergency and in the treatment of certain diseases these salts are prescribed by physicians, but best authority advises against indiscriminate use of any saline laxative. C.B.B.

Related Subjects. For further information on this subject the reader is referred to the following articles in these volumes:

Epsom Salts	Medicine and Drugs
Glauber's Salt	Seidlitz Powders

SALVADOR, *sahl va dohr',* a wildly picturesque, tropical country, the smallest but most progressive and most densely-populated of Central American republics. With an area of 7,225 square miles, Salvador is one-fifth the size of the state of Indiana, but its population of 1,225,800 in 1914 was almost half that of the state named, and averaged about 170 to the square mile. Salvador received its name from the Spanish adventurer, Pedro de Alvarado, who conquered it in 1524. For colored map, see North America.



LOCATION MAP

Climate, Land and Products. Along the coast of the republic there is a low plain about fifteen miles wide. This region is known as the *hot lands,* and is a place subject to fevers. The vegetation there is richly tropical, and balsam from the Balsam Coast, at the west, is an important article of export.

The interior of the country is rugged—a plateau about 2,000 feet above sea level, broken by mountains and volcanic cones, some reaching heights of from 6,000 to 8,000 feet. Izalco is the most noted of the volcanoes, and it has been active almost continuously for more than a hundred years. The south-central region around the capital, San Salvador, is especially subject to earthquakes, and that city has been destroyed eleven times by such disturbances since the middle of the sixteenth century. On the table-lands and mountain slopes, however, 12° north of the equator, the climate is temperate, even and healthful. From May to October is the wet season, called winter. From November to April is the dry season or summer. The rainfall is abundant for agricultural purposes, and most of the land is under cultivation, though primitive methods are still largely employed. The principal crop is coffee, and about $6,500,000 worth is exported yearly. Other important crops are cacao, rubber, tobacco and sugar. Cotton growing is encouraged by the government through granting bounties on exports. Attempts are being made at wheat cultivation, and tree planting is encouraged.

The most fertile and most populous region of Salvador is the magnificent valley of the Lempa, the chief river of the republic. This river is the largest on the Pacific coast of Central America, and is navigable by small steamers for 100 miles of its 200-mile course. Most of the lakes are of volcanic origin. The principal ones are Guija, which belongs partly to Guatemala, and Ilopango, in south-central Salvador.

Gold, silver, copper, iron and quicksilver are found, and mining industries are increasing in importance. Flour, indigo, sugar, balsam and rum are manufactured, but there is opportunity for much development. Considering the natural resources, manufacturing industries should in time be very profitable.

Transportation and Commerce. There are about 2,000 miles of good road in Salvador, and in 1914 there were over 190 miles of narrow-gauge railway. These railways connect the chief ports, Acajutla, La Libertad and La Union, with the chief cities, Santa Ana, San Salvador and San Miguel. La Union, at the southeast, is considered the best harbor in Central America. Trade is chiefly with the United States, Germany and France. Yearly exports in 1913 were valued at over $9,700,000 and imports at almost $6,400,000. The opening of the Panama Canal will in all probability materially increase these yearly figures.

People and Government. Over 770,000 of the inhabitants of Salvador are of mixed white and Indian blood, and are called Ladinos, or Mestizos. One-third that number are of pure Indian blood. So over 1,000,000, or the bulk of the population, are Ladinos and pure Indians, only about 250,000 of the people being foreigners. Yet the economic development and stability of the republic are markedly in advance of those of its larger neighbors, with populations very similarly proportioned.

Education is free and compulsory. In 1913 there were over 700 primary schools with an enrolment of over 44,000. There were also twenty-seven higher schools and a national university. Most of the people are Roman Catholics, and Roman Catholicism is the state religion, but other creeds are tolerated. Spanish is the official language.

Under a Constitution adopted in 1824 and frequently modified since that time, executive power is in the hands of a President, elected for four years. Legislative power is in a Congress of forty-two Deputies, elected for one year by universal suffrage. The governors of

the fourteen departments, or states, are appointed by the President.

History. After 1524 the country was a possession of Spain until 1821, when it revolted and joined the Mexican Confederation. Two years later it withdrew from that union, and later formed part of the republic of Central America. In 1853 it became independent. Like all South and Central American states, its progress has been greatly retarded by wars and revolutions. H.M.S.

Consult Martin's *Salvador of the Twentieth Century.*

Related Subjects. The reader is referred to the following articles in these volumes:

Alvarado, Pedro de	Coffee
Central America	San Salvador

SALVAGE, *sal'vaj,* a term denoting the service rendered in preserving life and in saving property from damage or loss, or the reward for such service. Originally salvage was restricted to the losses at sea, and awards were adjusted by the admiralty courts. In the United States salvage is awarded for ships, goods and life saved on lakes and navigable rivers on which interstate commerce is carried. *Military salvage* refers to rescuing property in time of war and usually pertains to ships and their cargoes. In large cities insurance companies maintain paid salvage corps to save property from loss by fire. The award for salvage is determined by the risk run and the value of the property saved. In all cases it is more than mere pay for time and labor expended, the excess being considered a reward for the effort made and also an inducement to others to engage in like work.

SALVA'TION ARMY, a religious body with semimilitary organization, whose purpose is to bring spiritual and material benefit to those whom the conservative religious bodies do not reach. Its founder, "General" William Booth, who was originally a Methodist minister, finding the Church unsympathetic toward his work for the unfortunate, began holding independent meetings for the poor, in 1864, in an unused graveyard in London. The organization which resulted was at first known as the Christian Mission; it did not receive its military name and system till 1878. The Army was remarkably successful in the East End of London, from which it spread throughout the United Kingdom and then to all English-speaking countries. It was introduced into the United States in 1880, where, however, disagreements caused the organization of a new society (see VOLUNTEERS OF AMERICA). Now its activities are carried on in Europe, Asia, Africa, North and South America and Australia.

The beliefs of the Salvation Army are those of evangelical Christianity. Piety and ability are the only qualifications required of the officers. Men and women have equal rights and both are dressed in uniform. It is the custom of the members to hold meetings in the open air, gathering a crowd by means of musical instruments and singing, and later inviting the people to a hall for further services. As many of their hearers are of the destitute classes, much relief work is necessary. A feature of their work is the Christmas dinner given every year to the needy poor. The Salvation Army maintains numerous orphanages and industrial and rescue homes, but these institutions serve more as clearing houses for the unfortunate than as places of permanent residences. There is also a training school for American workers, located in New York. The Army activities are supported by voluntary contributions, and the official publication is the *War Cry.* Among other periodicals are the *Young Soldier,* the *Social Gazette* and *All the World.* According to the latest statistics (1917) the Army maintains 9,673 posts throughout the world and 1,173 social institutions, and has 16,768 officers and cadets. See BOOTH (family).

Consult Manson's *The Salvation Army and the Public.*

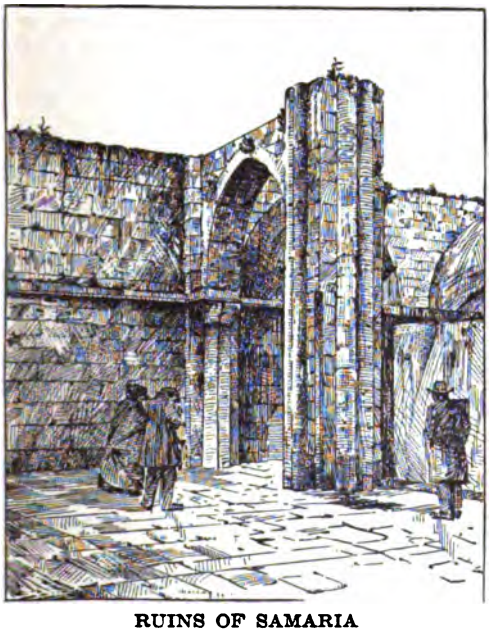
SALVINI, *sahl ve'ne,* TOMMASO (1829-1916), an actor, born at Milan, Italy. His parents were players, and they trained him in childhood for the same profession. He began to act during his fourteenth year, and at eighteen had risen to such prominence that he was chosen by Ristori to play leading rôles in her company. In 1847 he caused a sensation among Italian theatergoers in Rome by his vigorous acting in Alfiero's famous tragedy, *Oreste.* He left the stage in 1849 to fight in the Italian war for independence, but by 1851 was again playing with success. In 1868 he organized his own company, toured Europe repeatedly, and made five trips to America between 1873 and 1889. Everywhere audiences were astonished by his spirited and sometimes violent acting of tragic parts.

He had original views as to the nature of many characters in drama, such as Hamlet and Othello, whom he impersonated as vicious and unprincipled men. This attitude led to harsh criticism both in America and England, but the powerful effect of his work was never disputed.

He practically retired from the stage in 1890, but during the next twelve years appeared now and then in Rome, and audiences marveled at the vigor he retained in his extreme age. His book, *Records, Anecdotes and Impressions,* published at Milan in 1895, is considered of value to students of the European theater.

SAMARIA, *sa ma'ri a,* the capital of the northern kingdom of Israel during the reigns of the later kings. It was built by Omri, in the ninth century B. C., and named for the original owner of the site, Shemer (*I Kings* XVI, 24). Samaria was captured by the Assyrians about 722 B. C., and the region was repopulated with immigrants from the east, who were thereafter known as Samaritans (see below). After a long and troubled history the town was given by the Emperor Augustus to Herod the Great, who named it Sebaste and rebuilt it on a magnificent scale. It survives at the present day in the small village of Sebastiyeh.

Samaritans, *sa ma'ri tanz,* originally Babylonian and Assyrian colonists brought by the king of Assyria to take the places of the deported Jews after the fall of the northern kingdom (*II Kings* XVII, 24). A Jewish priest was sent to teach them "the manner of the God of the land," and they gradually dropped their heathen observances and adopted the religion of the Pentateuch. After their return from the exile, the Jews scorned the proposal of the Samaritans that they be permitted to assist in the rebuilding of the Temple. Later the Samaritans built a temple of their own, on Mount Gerizim. This was destroyed by John Hyrcanus (about 120 B. C.).



RUINS OF SAMARIA

These walls have stood since the early years of the Christian Era.

At the time of Christ, though the Samaritans dwelt in the very center of Palestine, the Jews "had no dealings" with them, because they regarded them as heretics. Jesus went through their land and held his memorable conversation with the Samaritan woman at the well of Jacob (*John* IV, 1-26), and Philip preached the gospel later to the Samaritans. On the overthrow of Palestine by the Romans, the Samaritans shared the fate of the Jews and were scattered abroad among different nations. A very small colony of them still persists, in Nabius, near the ancient Samaria.

Consult Montgomery's *The Samaritans, the Earliest Jewish Sect;* Cheyne's *Jewish Religious Life after the Exile.*

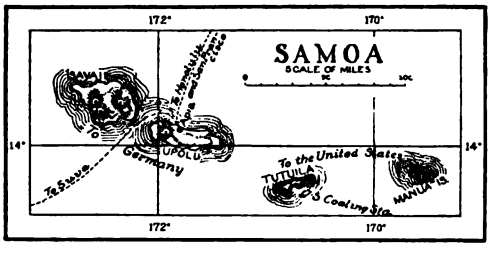
SAMARKAND, *sam ar kant',* capital of the territory of the same name, is a famous city of Russian Turkestan. It is situated about 140 miles east of Bokhara, on the Transcaspian Railway (see colored map, Asia, opposite page 417). The city occupies the site of ancient Marakanda, which Alexander the Great destroyed in 329 B. C. during his invasion of Central Asia. In the fourteenth century Samarkand became the residence of the great Mongol conqueror Timur, or Tamerlane, and he made it one of the most magnificent cities in Asia.

The original city, which is still partly enclosed by the old wall, contains several famous mosque schools and a beautiful mausoleum with a dome of blue tiles, within which are the tombs of Timur and his family. Outside of the wall is one of the most splendid mosques in Central Asia—that of Shah-Zindeh—famed for its interior decorations. The Russian and newer portion of Samarkand, which lies beyond the ancient citadel, is regularly built and has the general aspect of a modern Asiatic city. There is considerable trade in cotton, rice, silk, gold and silver wares, pottery and wines. Population in 1910, 89,693.

SAM'NITES, an Italian people of Sabine origin, who lived in the mountainous region of Southern Italy in ancient times. They were divided into four nations: the Caraceni in the north; the Pentri in the center; the Caudini in the Southwest; and the Hirpini in the south. After four terrible conflicts with the Romans the Samnites were almost exterminated. See ROME, subhead *History.*

SAMOA, *sah mo'ah,* or **SAMOAN ISLANDS,** formerly called NAVIGATOR ISLANDS, is an archipelago of fourteen islands in the South Pacific Ocean, 4,200 miles southwest of San Francisco and 2,400 miles northeast of Sydney, Australia (see colored map, with the article OCEANIA). They have a combined area of about 1,100 square miles. At the outbreak of the War of the Nations in 1914 the Samoan archipelago was owned partly by Germany and partly by the United States. On August 29, 1914, a British force from New Zealand occupied Apia, a port of the German island of Upolu, and eventually all of German Samoa was brought under the administration of New Zealand.

Tutuila and all other Samoan islands east of the 171st meridian, west longitude, came into the possession of the United States in 1900, according to a treaty negotiated by the United States, Germany and Great Britain. Tutuila has an area of about seventy-seven square miles and a population of about 7,250; it is the most attractive island of the group, and has the only good harbor in Samoa, that of Pagopago. The United States maintains a naval station on Tutuila, the commandant of which is also the governor of the island. The most important of the other American islands, known as the Manua group, have a combined area of twenty-five square miles and a population of about 1,800. Germany, by the treaty mentioned above, acquired all islands west of the 171st meridian. The most important of this group are Savaii, 660 square miles in area, and Upolu, 340 square miles. These are the two largest

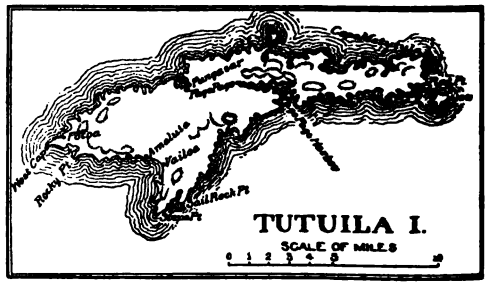


THE SAMOAN ISLANDS

The western islands are yet credited to Germany, for their fate after the War of the Nations is in doubt.

islands in Samoa. Upolu was for years the home of Robert Louis Stevenson, and his grave is on beautiful Mount Vaea, overlooking Apia.

Most of the islands are very beautiful, with picturesque mountains, luxuriant forests, fertile valleys and flat lands sloping towards the sea. The climate is pleasant on the whole, although fierce hurricanes occur from January to March. In 1889 two American and two German warships were beaten to pieces on the beach at Apia in a memorable storm which Stevenson describes in *A Footnote to History.* The forests are remarkable for the size and variety of



ISLAND OF TUTUILA

The central island of the group, belonging to the United States.

their trees, and the luxuriance and beauty of the creepers, tree ferns and parasites. There are sixteen varieties of the cocoanut palm and twenty varieties of breadfruit tree, which provide the natives with their principal food. Copra, the dried meat of the cocoanut, is exported. There are no animals except a native rat, four species of snakes and a few birds. The native Samoans, who number about 39,000, are the best type of Polynesians—tall, well built, brown-skinned and good looking. They are simple, honorable, generous and hospitable, and are brave fighters and famous sailors and boat-builders. A.C.

Consult La Farge's *Reminiscences of the South Seas.*

SAMOS, *sa'mahs,* an island belonging to Turkey, situated in the Grecian Archipelago and separated from the coast of Asia Minor by the strait Little Boghaz. It covers an area of 289 square miles, and the population, consisting almost entirely of Greeks, is 65,000. The capital is Vathy, situated near the site of ancient Samos, a magnificent city in the times of ancient Grecian power.

Olives, grapes and other fruits are cultivated; oil, wine, silk, cotton and figs are exported. The island contains considerable mineral wealth, marble, silver, iron, lead and emery being found, but not extensively worked. The island is administered by a governor styled the *Prince of Samos,* who pays annual tribute to the sultan of Turkey.

SAMP'SON, WILLIAM THOMAS (1840-1902), an American naval officer, who planned the blockade of Santiago harbor in the Spanish American War, was born in Palmyra, N. Y.,

the son of Irish immigrants. William went to the public schools and studied at home, in 1857 was appointed midshipman in the United States Naval Academy, and was graduated in 1861, just at the beginning of the War of Secession. The next year, following service on the *Potomac,* he was advanced to the rank of second lieutenant. Later, as executive officer on the *Patapsco,* he was ordered to clear the Charleston harbor of mines and torpedoes, and succeeded in entering the harbor, but his ship was blown up, and Sampson was rescued 150 feet from the wreck. He was then made lieutenant-commander, and in 1866 served on the *Colorado,* the flagship of the European squadron. From 1868 to 1871 he was an instructor in the Naval Academy.

REAR-ADMIRAL SAMPSON
Because he was not present during most of the Battle of Santiago and the successful encounter was directed by Commodore Schley, the partisans of each engaged in a bitter controversy over the question of honors for the victory.

Sampson held many positions of trust, among others those of assistant superintendent of the United States naval observatory, superintendent of the Naval Academy, delegate to the international maritime conference, presiding officer on the board of inquiry into the sinking of the *Maine,* and member of the commission to arrange for the evacuation of Cuba.

In 1889 he was made captain on the first modern steel cruiser, and in 1897 was commander of the battleship *Iowa.* At the outbreak of the Spanish-American War in 1898 he was given charge of the North Atlantic squadron, and was commander-in-chief of the United States naval forces off the coast of Cuba. Sampson was in charge of the blockade of Santiago Harbor, but while he was at Siboney conferring with General Shafter, who commanded the land forces, the Spanish fleet attempted to escape, and Sampson only reached Santiago in time to witness the last of the battle, which in his absence had been directed by Winfield Scott Schley. In 1899 he was advanced to the rank of rear-admiral. He took command of the Charleston navy yards, but withdrew from active service when he reached his sixty-second year, the age of retirement. Sampson died in Washington, D. C., May 6, 1902. He was considered one of the highest authorities on ordnance.

Related Subjects. The reader is referred to the following articles in these volumes:

Santiago, Battle of — Shafter, William Rufus
Schley, Winfield Scott — Spanish-American War

SAM'SON, a popular hero and judge of the ancient Hebrews, famed for remarkable strength. The story of his life is told in the Bible in chapters fourteen to sixteen of the book of *Judges.*

Before his birth, Samson's mother was commanded by an angel to bring up the child as a Nazarite, which meant that he must never drink wine, eat "unclean things" or cut his hair. When Samson fell in love with a Philistine woman and she proved faithless, he took revenge by setting fire to the fields and vineyards of her people. The Philistines retaliated by forcing Samson's countrymen to surrender him into their power. Then "the Spirit of the Lord came upon him;" he broke his bonds, and with the jawbone of an ass killed a thousand of his enemies. Later they conspired to recapture this dreaded foe by locking the city gates of Gaza to prevent his escape, but he tore out doors, posts and all, and carried them to a hilltop forty miles away.

Samson's downfall finally came about through a Philistine woman named Delilah. Coaxing from him the secret that his strength lay in his unshorn locks, she treacherously cut them off while he slept. He was imprisoned and blinded. When the great festival of their god Dagon arrived, the Philistines gathered by thousands in the temple to gloat over Samson's defeat. But during his captivity his hair had again grown long, bringing back his former might, and, with a prayer for power, he pulled down the two great pillars which supported the roof. The temple collapsed, and thus "the dead which he slew at his death were more than they which he slew in his life." According to Biblical history, all this happened in 1113 B. C.

The life of Samson forms the basis of Milton's drama, *Samson Agonistes,* and also of the opera *Samson and Delilah,* by Saint-Saëns. Many students find in the story traces of ancient sun myths, and some compare his exploits to the famous Twelve Labors of Hercules in Greek mythology; in fact, Samson is often called "the Jewish Hercules." L.M.B.

Consult Carus's *The Story of Samson and Its Place in the Religious Development of Mankind.*

SAMUEL, *sam'u el,* the earliest of the Hebrew prophets after Moses, and the last of the judges of Israel, who freed his country from foreign oppression and idolatry. Although born in Ramah, he was taken to the tabernacle at Shiloh while still a young child, by his mother, Hannah, who had promised that he should be consecrated to the service of God. There the boy grew to manhood under the guidance of the high priest, Eli. When Samuel was twelve years old God revealed to him the approaching doom of Eli's house, and by the time the boy had grown to manhood all Israel knew that he was to be a prophet of the Lord. Twenty years after Eli died Samuel led his people to Mizpah, where they prayed and fasted until the Philistines suddenly attacked them. By the aid of God the Israelites gained such a victory over their enemy that they never dared to invade the land again while Samuel was at the head of affairs. From that time on the people, who had been gradually reforming under their leader's guidance, faithfully worshiped God.

When Samuel was old he made his two sons judges at Beersheba, but they proved unworthy of their trust, so, upon the request of the Israelite elders and people, he anointed Saul as king. Later on God was displeased with the actions of Saul and told Samuel to anoint David as ruler. Soon after this the old man died, while David was still a fugitive from Saul, and was buried in Ramah, all Israel lamenting his loss. According to Hebrew chronology he lived from 1165 to 1060 B. C., but recent authorities differ greatly in their opinions concerning these dates.

The Books of Samuel, which were originally one book written by some unknown author, relate not only the life of Samuel but also describe the reigns of Saul and David, the two kings whom he anointed. They form two books of the Old Testament at the end of the period of judges, and were probably written by some prophet before the fall of Jerusalem. E.C.

Consult Meyer's *Samuel the Prophet;* Douglas's *Samuel and His Age.*

SAMURAI, *sah'moo ri,* the military class during the feudal period in Japan. Originally applied only to the military guards of the Mikado's palace, the term later was used to describe the whole military system of the country. The samurai class included the *shogun,* or commander-in-chief, the *daimios,* or feudal nobles, holding land in exchange for military services, and their retainers, including the privileged "two sword" men, the great fighters of the country.

The feudal system was abolished in 1871, the *daimios* gave back to the emperor the lands they held and received pensions for themselves and their retainers. The wearing of swords was prohibited, and the *samurai* and *daimios* became the "nobility" and "gentry" of Japan. In 1912 General Nogi, a famous Japanese of the *samurai* class, followed an old *samurai* custom by committing suicide, along with his wife as a token of grief at the death of Emperor Mutsuhito. One of the privileges of the *samurai* was that of committing suicide by hara-kiri rather than live to face dishonor.

SAN ANGELO, *an'jeh lo,* TEX., the county seat of Tom Green County, situated southwest of the center of the state, 239 miles southwest of Fort Worth and 449 miles east of El Paso. It is at the junction of the North, Middle and South Concho rivers and on the Gulf, Colorado & Santa Fe and the Kansas City, Mexico & Orient railroads. Stock raising is the chief industry of the surrounding country. The city is a wholesale distributing center, and has an iron foundry, machine shops, a cottonseed-oil mill, grain elevator and creamery. Prominent features are a Federal building erected in 1911 at a cost of $130,000, and Saint John's Hospital (Roman Catholic). The city adopted the commission form of government in 1915. In 1910 the population was 10,321. The area exceeds four square miles. T.F.O.

SAN ANTO'NIO, TEX., the oldest, the largest in 1910, and the most romantic city in the state. It is built partly of modern steel and concrete and partly of adobe houses built in an early day by Mexican settlers, with a background of sunny skies, semitropical foliage and historic relics. San Antonio is situated about midway between the geographical center of the state and its southernmost extremity, in Bexar County, of which it is the county seat, and on the San Antonio River. Austin, the state capital, is eighty miles northeast, Houston 280 miles southeast, and Laredo is 150 miles southwest. Railway transportation is provided by the Southern Pacific, the International & Great Northern, the Missouri, Kansas & Texas, the San Antonio & Aransas Pass, the Gulf Shore and the San Antonio, Uvalde & Gulf lines. Mexicans comprise about twenty per cent of the population, which in 1916 was 125,831 (Federal estimate); the census of 1910 reported 96,614. The area is a little less than thirty-six square miles.

Description. San Antonio is unlike any other city in America. It is spoken of as "the city of a thousand charms," for it possesses a delightful, healthful climate, beautiful residences, parks and plazas, fine roads, facilities for bathing and boating and an abundance of artesian and mineral waters; to these are added all the attractions that an army post can bring into the social life of a community. Seventeen iron bridges span the river, which winds gracefully through the city and through Brackenridge Park (250 acres), a popular feature of which is the Lambert Bathing Beach. The park is a woodland and contains an interesting zoölogical garden; it is the largest of the city's park reservations. San Pedro Park, with famous springs, is the site of the original Indian settlement of San Antonio. Besides these, the city has a number of smaller parks and green spots called plazas. San Antonio has several attractive suburbs, including West End, Alamo Heights and Hot Sulphur Wells; the last named has medicinal baths. Fort Sam Houston, on the outskirts of the city, is one of the largest army posts in the Union; it covers almost 1,000 acres, and represents an investment of nearly $5,000,000.

Buildings. The Alamo, the most famous structure, is held in reverence by all Texans for the part it played in the Texan Revolution (for illustration and description, see ALAMO). Other buildings of historical interest are the

THE SAN JOSÉ MISSION

The most famous of the old Spanish mission buildings still standing in or near San Antonio. Nearly all of them were built between 1720 and 1750.

San Fernando Cathedral and the ruins of four old Franciscan missions. San Antonio has a magnificent city hall in the center of a plaza, a massive courthouse, a Federal building, and a convention hall which is also a market house. There are more than fifty churches, the most striking of these being the two cathedrals. Although the city has no universities or colleges, it is an educational center of importance in the Southwest, having fourteen preparatory schools, forty-five private schools, thirty-four public schools (three for negroes) and a Carnegie Library. San Antonio has long been a resort for health seekers, because of its climate and mineral water. There are four public hospitals, and a number of fine hotels, notably the Gunter and Saint Anthony.

Commerce and Industry. The city is the distributing point for a territory as large as the state of Ohio, and is the retail center for Southwest Texas and a large portion of Mexico. It is located near a great live-stock country, and in the mountainous district to the northwest the raising of Angora goats is an important industry; the greater supply of mohair used in the United States comes from this section. The territory around San Antonio is also rich agriculturally, all kinds of fruit, vegetables and forage crops and great quantities of cotton and pecans being grown. The leading industrial plants of the city are breweries, cotton presses, broom factories, oil mills and refineries, packing houses and cement works. There are about 470 factories, their annual output being estimated at over $36,600,000; the deposits of oil and natural gas in the vicinity, combined with fine shipping facilities, offer inducements to further increase in manufacture.

History. The present site of San Antonio was occupied by settlers from Monterey in 1715, but the permanent settlement was made in 1718 by Spaniards, some families from the Canary Islands settling at that time on what is now known as the Main Plaza. The place (San Antonio de Bexar) was named in honor of Saint Anthony (San Antonio) and the Duke de Bexar. It was an important military station, and the capital of Texas while it was a Spanish and Mexican province. During the war between Mexico and Spain it was the scene of fierce fighting and cruel bloodshed. In the war for Texan independence eight battles were fought in and near San Antonio. Here, in 1836, occurred one of the most memorable and most tragic conflicts in American history, when 179 brave Texans, including such famous frontiersmen as Davy Crockett, James Bowie and William Travis, were massacred by the Mexicans under Santa Anna, while defending the church of the Alamo, which had been converted into a fort.

In 1840 there was more fierce fighting with the Indians; in 1842 the city was again taken by the Mexicans, and after another desperate bat-

tle was retaken by the Texans. San Antonio has been a military station for troops since the close of the Mexican difficulties, save during the War of Secession. An arsenal for the manufacture and storage of ammunition is also located here. In 1878 the first railroad was built to the city and since that time its growth has been remarkable. In 1913 the commission form of government was adopted, providing for a mayor and three commissioners. J.B.C.

SAN BERNARDINO, *ber nahr de'no,* CAL., the county seat of San Bernardino County, situated in the southwestern part of the state, sixty miles east of Los Angeles and 125 miles northeast of San Diego. It is on the Southern Pacific, the Atchison, Topeka & Santa Fe and the San Pedro, Los Angeles & Salt Lake railroads, and has electric interurban service. In 1910 the population was 12,779; in 1916 it was 16,945 (Federal estimate). The area of the city is nearly seven square miles.

San Bernardino is situated in a beautiful valley of the San Bernardino Mountains, and its abundant, semitropical vegetation is delightfully green and refreshing in contrast with the stunted growths of the great Colorado Desert, which reaches nearly to the city. It is in the California orange belt; in the surrounding region are also grown plentiful crops of lemons, grapes, apples, hay and alfalfa. The city has an important wholesale trade, mining and stock-raising interests, and foundries and machine shops, the railroad shops of the Santa Fe, which employ from 1,200 to 1,500 men, box factories, artificial stoneworks, and an extensive pre-cooling plant.

The city contains a fine courthouse, a Carnegie Library, Y. M. C. A. building and a $275,000 polytechnic high school. There are two attractive parks, and directly east, in the San Bernardino National Forest, are many lake resorts. San Bernardino was founded by Mormons in 1851, on the site of an earlier mission of that name, and became a city in 1860.

SAND consists of fine particles of quartz and feldspar, mixed loosely in a mass. When sand is cemented together by some other mineral it forms sandstone. Most sand has been formed by the wearing away of rock, and it is still being formed wherever the waves of the sea or any other large body of water are coming in contact with sand-bearing rock. Many miles of ocean beaches are covered with sand, and in some localities, such as Dune Park in Indiana and along the eastern shore of Lake Michigan, there are series of sand hills which look like small mountains. Some sands contain the ores, iron, gold, and platinum, and other metals are occasionally obtained from sand in paying quantities. Sand is used in the manufacture of glass, in making mortar for bricklaying and for filters.

Related Subjects. For information that will be of interest in this connection, the reader may consult the following articles in these volumes:

Dune	Quartz
Feldspar	Sandstone
Glass	Soil

SAND, GEORGE (1804-1876), a French novelist, whose real name was ARMANTINE LUCILE AURORE DUPIN DUDEVANT, was born at Paris. Her father was a French officer and her early childhood was spent among the rough soldiers of his regiment. Strictly speaking, she received no education. Between her eighth and fourteenth years she lived in the country near Nohant, France, and learned a little of literature, Latin and Italian. In 1822 she married a country squire, M. Dudevant, and lived an uncomfortable life for nine years, but separated from him in 1831, partly because of his habits, but far more because of the wide difference in their tastes and intellectual abilities. She gave him practically her entire fortune and received in return a yearly allowance of six hundred dollars, gladly choosing freedom at such a sacrifice; then she went to Paris, where she began to write for the *Figaro.* There she met Jules Sandeau, lived with him some years, and they collaborated in the writing of her early books. The couple used the pen name Jules Sand, but when she wrote her first novel, *Indiana,* independently, she changed the pen name to GEORGE SAND.

Indiana caused much excitement and numerous literary and legal discussions because of its arguments against the continuance of marriage vows after affection is dead. George Sand fully lived up to her doctrines of freedom, and passed with surprising quickness from one lover to another. In spite of her many courtships she found time to write methodically and rapidly, with the result that of all women authors she was the most prolific.

Her work may be divided into five periods. Previous to 1836 she wrote such novels as *Lelia, Jacques, Andre* and *Metelle,* dealing with misplaced love and with herself idealized as the heroine. Then, in the second period, from 1836 to 1840, she became interested in socialism and produced such stories of ideal government as *Mauprat, The Seven Strings of the Lyre* and

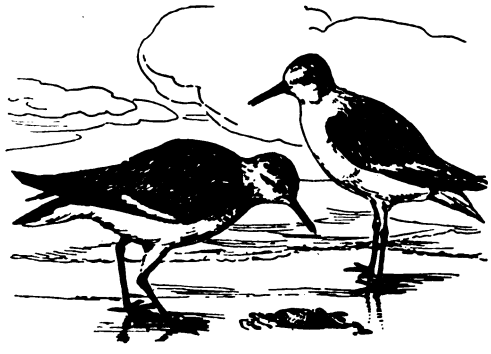
Gabriel. The third period, extending to 1847, deals, in *Consuelo* and *The Sin of M. Antoine,* with rather uninteresting political speculations. In the fourth period she returned to her love of nature and wrote exquisite descriptions of rural life in *Little Fadette* and *The Snow Man.* During the last years of her life she dealt once more with analysis of character and emotions in such novels as *The Marquis of Villemer* and *Flamaraude.* She had an extraordinary sympathy for her fellow beings, an almost unsurpassed ability in portraying the progress of love and the artist's genius for creating glowing descriptions.

Consult Doumic's *George Sand: Some Aspects of Her Life and Work* (translation by Hallard).

SAN'DALWOOD, a costly, fragrant wood yielded by several species of trees growing in the East Indies and other tropical islands. The variety most generally seen is white sandalwood, but yellow and red sandalwoods are also marketed. Sandalwood is used in making cabinets and chests and small objects of an ornamental nature, such as fans and fancy boxes. Incense sticks are also made from it. Because of the heavy fragrance of the wood insects will keep away from clothing stored in sandalwood chests. Sandalwood oil, obtained by distillation, is used in perfumes and medicinally. The heartwood of red sandalwood yields a coloring matter used in dyeing wool; it is also the basis of certain tooth powders.

SAND BUR, or **BUR GRASS,** an annoying prickly weed, native to the plains of the Western United States, and found growing in sandy regions in almost all temperate and tropical countries. The plant has stems from one to two feet long, bearing spikes of ten to twenty spiny burs which cause painful wounds when they enter the flesh. Sometimes the burs become so matted and entangled in the wool of a sheep that the whole fleece is useless for commercial purposes. A species common to the South is called the *cockspur,* and is no less troublesome than the sand bur.

SAND'ERLING, a bird belonging to the same family as the snipes and sandpipers, but distinguished from these birds in having three toes. It is a true beach bird, and is usually found on shores washed by the sea; its food consists of small shellfish and marine insects washed up by the tide. In America the sanderling breeds in the Arctic regions, but after August it winters from California and Texas to Southern South America and various Pacific islands. It is about eight inches long; in winter the plumage is gray on the upper parts and pure white beneath. The three or four eggs are of a brownish-olive color, speckled with darker



SANDERLINGS

markings, and are laid in a tuft of weeds, or in a depression lined with dry grass.

SAN DIEGO, *de a'go,* CAL., the county seat of San Diego County and a health and pleasure resort, is situated in the extreme southwestern corner of the United States, 125 miles southeast of Los Angeles. It is located on the only landlocked, deep-water harbor between the Panama Canal and San Francisco Bay, and is the home port of important steamship lines operating vessels to the American Pacific coast and foreign ports. The Atchison, Topeka & Santa Fe Railroad enters the city from the north, and the San Diego & Arizona Railroad from the southeast. The population of 39,578 in 1910 had increased to 53,300 (Federal estimate) in 1916. The area of the city is seventy-four square miles.

Parks, Buildings and Institutions. San Diego is a semitropical city, modern in every respect, yet having the atmosphere and charm suggestive of the Spanish period in America. In the center of the business section is the Plaza, a park bordered by date-bearing palms. Of several beautiful public parks, Balboa Park, containing 1,400 acres, is the most noteworthy. It extends along both banks of a deep arroyo (dry gully) in the northeastern part of the city. Here in 1914-1915 was held the Panama-California Exposition, the permanent improvements and buildings of which are valued at more than $2,000,000. The prominent public buildings of San Diego are the courthouse, the U. S. Grant and San Diego hotels, the handsome buildings of the state normal and the Polytechnic high school, the Federal building, Masonic Temple, Carnegie Library, bank buildings and churches.

In addition to the state normal school, the city contains the San Diego Army and Navy

Academy, the Philosophical School, a Federal aviation school and several private institutions. The largest hospitals are the Agnew, Saint Joseph, Paradise Valley and McNab.

Suburbs and Environs. Among the city's famous beach resorts are La Jolla and Coronado. The latter is built upon an enlargement of the neck of land protecting the harbor. It has the well-known Hotel del Coronado, with Japanese and botanical gardens and Tent City. On Point Loma, owned by the United States government, are Fort Rosecrans and coaling, quarantine and wireless stations. East of Coronado is the United States torpedo boat and submarine station. Imperial Valley, a section of vast agricultural possibilities, lies east of San Diego. It has many thriving towns, and its farmers and stock growers reach the large markets through San Diego.

Commerce and Industry. The city has an export trade valued at nearly $1,000,000 a year, while its imports are over $1,800,000. The leading industries of the city are those connected with the marketing of citrus fruits, especially lemons, and the manufacture of citrus products; meat products (canned sardines and canned tuna), lumber, onyx and marble products, ostrich feathers, salt, automobile tires and olive oil are other important manufactures. The combined factory products of the city are valued at $9,000,000 a year.

History. San Diego Mission, founded in 1769, was the first mission in California. The ruins stand about three miles north of the modern city. Old Town, the first settlement, stood west of the Mission, near the present city. A few of the old adobe dwellings remain, the best known of which is the one where Helen Hunt Jackson had her heroine, Ramona, married. Fort Stockton was established in 1846 by Commodore Stockton, who took possession in the name of the United States. Modern San Diego was incorporated in 1872 and was made a port of entry in 1873. The commission form of government, adopted in 1909, was replaced in 1915 by the city-manager plan (see the article CITY MANAGER). P.G.J.

Consult Smythe's *History of San Diego.*

SAND'PIPER, a small shore bird with a long, highly-sensitive bill with which it probes in the soft mud or sand for worms, shrimps, shellfish and soft mollusks. Sandpipers often follow the receding waves, singly or in flocks, searching for delicate bits, their graceful movements and cheerful cries endearing them to observers. Celia Thaxter wrote of the sandpiper in a poem, beginning:

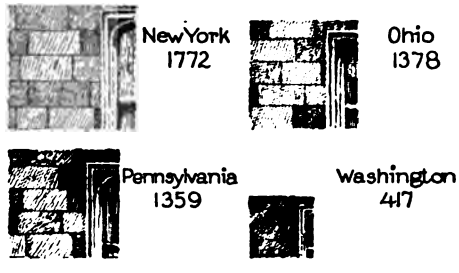
> Across the lonely beach we flit,
> One little sandpiper and I.

Sandpipers are found in all parts of the world; some species nest within the Arctic Circle. The eggs, three or four in number, are a light gray, buff or olive, boldly spotted with dark brown. The plumage of the birds, of

SPOTTED SANDPIPER

varying shades of buff, brown, gray, white and black, is modest but pleasing; one important species is spotted. The *knot, durlin, sanderling, ruff, pectoral* and *semipalmated* are well-known species.

SAND'STONE, a rock composed of grains of sand cemented together by some other substance, which may be carbonate of lime, silica or iron. The particles of sand were probably cemented under great pressure and under the influence of heat, though the temperature was not high enough to melt the substances. In the United States sandstone is found in large quantities in Northern New York, in Ohio, Penn-



LEADING STATES IN PRODUCTION

sylvania, Washington, Iowa, Michigan and in the valley of the Connecticut River. There are extensive quarries in Nova Scotia and Alberta, Canada.

The color of sandstone varies from light to dark brown. Varieties in which silica forms the cement have a glassy appearance, and in some localities this stone is quarried for use in the

manufacture of glass. Some varieties are of beautiful shades of gray, others are red or brown. Formerly brown sandstone was extensively used in the construction of palatial residences in New York and other cities. Some varieties are soft when taken from the quarry, but harden on exposure to the air. Sandstone is a good building stone, since it is easily worked and durable, but it is not desirable for structures in which great strength is required. The fine-grained varieties are used in making grindstones and whetstones. Among the best-known kinds of sandstone are the *Berea* of Ohio, the *Triassic brownstones* of the Connecticut Valley, the *Potsdam quartzite* of New York and the *Old Red Sandstone* of England.

Related Subjects. The reader is referred to the following articles in these volumes:

Building Stone	Glass
Geology	Stratified Rocks

SANDUSKY, *san dus' ki,* OHIO, the county seat of Erie County, situated on the south shore of Sandusky Bay, about five miles from Lake Erie. Toledo is forty-eight miles northwest and Cleveland is sixty miles east. The city is on the Baltimore & Ohio, the Cleveland, Cincinnati, Chicago & Saint Louis, the Lake Erie & Western, the New York Central and the Pennsylvania railroads, and has extensive electric interurban service. Steamers are operated to Canadian and United States lake ports during the greater part of the year. In 1910 the population was 19,989; it was 20,193 (Federal estimate) in 1916.

Sandusky is well situated on sloping land overlooking an excellent harbor. Near the city are several islands; on Put-in-Bay is the Perry Memorial; Cedar Point is a summer resort with homes and clubs, and Lakeside is a famed Chautauqua resort. The courthouse and new $250,000 high school building are in a parked square in the heart of the city. Other prominent buildings are the public library, Ohio Soldiers' and Sailors' Home, the Masonic and Odd Fellows' temples, two hospitals and several churches. Other noteworthy features are the weather bureau station, the customhouse and United States fish hatchery, the latter at Put-in-Bay; there is a state hatchery at Lakeside.

Along the harbor are extensive loading docks. Coal and ore, sugar, lumber, fish, ice, grain, fruits, sand and lime are the principal articles of trade. The industrial establishments include shipyards and manufactories of iron and steel products, glass and cement, baskets, crates and barrels, underwear, dynamos, engines, strawboard, crayons and furniture. The total annual value of manufactured products is about $6,000,000.

Sandusky was settled in 1817, was incorporated as a city in 1845 and in 1915 adopted the commission form of government.

SANDWICH, ONT., the county seat of Essex County, on the Detroit River, opposite Detroit. It is two miles from Windsor, its banking point, and is connected with that and other cities by the Essex Terminal Railway. The town has a Dominion fish hatchery of importance, and it manufactures, among other articles, salt, robes and chemicals. A Roman Catholic school, Assumption College, is here.

SANDWICH ISLANDS. When Captain James Cook discovered in 1778 a group of green-clad islands in the middle of the wide Pacific, he called them the Sandwich Islands, in honor of John Montagu, fourth Earl of Sandwich (1718-1792), who was then First Lord of the British Admiralty. This was the earl whose name survives as the inventor of that popular article of food, the "sandwich." As the islands became better known, however, and of more importance commercially, this English name was gradually replaced by Hawaii, applied by the natives to the group. See HAWAII.

SANDY HOOK, a low, sandy peninsula, about eighteen miles south of Manhattan Island, partly enclosing New York Bay and between the Atlantic Ocean and Sandy Hook Bay. It runs about six miles northward from the coast of New Jersey and is less than a mile in greatest width. Its northern extremity is guarded by a beacon light, and about one mile south of this there is a lighthouse ninety feet high. Fort Hancock is situated at the outermost point of the peninsula, a portion of which is also used by the United States government as a testing ground for heavy ordnance and armorplate.

SANFORD, ME., an industrial town of York County in the southwestern corner of the state, thirty-six miles southwest of Portland and ninety-two miles north and east of Boston. An electric line connects with the Boston & Maine Railroad, one mile distant. The town is on the Mousam River, which furnishes water power for a number of mills whose principal products are shoes, plush, linings, blankets, yarn, woolen goods, carriage robes and lumber products. The shoe factory of Sears, Roebuck Company is located here. Sanford was settled about 1740 and was incorporated in 1768. The population in 1910 was 9,049; in 1916 it was 10,916 (Federal estimate). C.E.V.

SAN FRANCISCO, "the city loved around the world," is the principal seaport on the Pacific coast of America, situated on a hilly peninsula between the Pacific Ocean on the west and San Francisco Bay on the east. Golden Gate (which see) connects the bay and the ocean and bounds the city on the north.

San Francisco Bay, including its northern extension, San Pablo Bay, is fifty-five miles long and from three to twelve miles wide. It is the largest bay on the western coast of the United States and one of the greatest harbors in the world. On the eastern shore and directly opposite San Francisco are Oakland, Alameda and Berkeley, all connected with the larger city by ferries.

The story of the city is summed up in few words by Frank Morton Todd, an observer of American cities:

Born a drowsy, Spanish hamlet, fed on the intoxicants of a gold rush, developed by an adventurous commerce, isolated throughout its turbulent history from the home lands of its diverse peoples and compelled to the outworking of its own ethical and social standards, San Francisco has evolved an individuality and a versatility beyond any other American city.

General Description. The city occupies an area about seven miles square and comprises the county of San Francisco. The site is hilly, and some of the elevations rise abruptly from sea level to altitudes of 400 to 900 feet. The ranges of hills are separated by nearly parallel valleys, and the diversity of surface imparts to the city a picturesque appearance. The streets are broad and straight and, with few exceptions, cross at right angles. Those in the northern, central and western parts of the city extend approximately north and south and east and west, but in the southern part most of the streets extend northwest and southeast and northeast and southwest. Market Street, the great thoroughfare, extends from the Ferry building southwest to Twin Peaks and divides the city into two nearly equal parts. The streets to the south of Market are parallel with it and at right angles to it, but those on the north extend north and south and east and west.

That portion of the site bordering on the bay is low and level, and the land on which the Ferry Building stands and that occupied by the docks and warehouses have been reclaimed by filling in. On the Pacific coast a ridge of sand dunes protects the city from the winds. Along the west side of the city extends the Great Highway, following the ocean for three miles and connecting with other drives and boulevards leading to all parts of the city. Electric and cable cars connect the business sections with all outlying points. The hillsides are dotted with beautiful homes. Whether it be approached from the bay or from the ocean San Francisco presents a beautiful appearance. Viscount Bryce, former British ambassador to the United States, says of it:

Few cities in the world can vie with San Francisco either in the beauty or in the natural advantages of her situation; indeed, there are only two places in Europe—Constantinople and Gibraltar—that combine an equally perfect landscape with what may be called an equally imperial position.

From the summits of Telegraph Hill and Russian Hill, and from the reservoir near Twin Peaks, magnificent views of the city and its surroundings may be obtained.

Parks and Boulevards. San Francisco has over thirty parks and public squares, whose combined area is about 1,400 acres. Golden Gate Park, having an area of 1,013 acres, is one of the largest city parks in America. It has a frontage on the Pacific of about half a mile and extends inland for four miles. The park contains long drives, walks, lakes and hills whose summits offer fine views to the visitor. Nine baseball diamonds, a dozen tennis courts, handball courts, a completely equipped playground for children and a stadium enable the lovers of sports and play to satisfy their desire for exercise amid beautiful surroundings. Interesting plants from all parts of the world are found in the gardens and the collection of animals includes deer, elk and Alaskan moose. In the aviary are many rare and interesting birds,

n the buffalo paddock is one of the finest
i of buffalo in the country. In the museum
irt gallery are valuable collections of Ori-
carvings, relics of Napoleon and a large
ber of specimens of interest to students of
ıy and zoölogy. The art collection in-
s works from some of the leading sculp-
and painters.

ıcoln Park, occupying elevated ground in
ıorthwest section of the city, is of interest
ıse of the view it affords to the entrance
e harbor. To the north and east of Lin-
Park is the Presidio, a large military reser-
n and fortress. The Panama-Pacific-Inter-
nal Exposition was located just east of the
dio. East of the exposition grounds is
Mason.

portant Centers. The Ferry Building,
ı is the great gateway to the city, is the
. from which all lines of industry radiate.
building is an imposing structure 650 feet
surmounted by a tower in which is a large
. Here all the ferries crossing the bay
: their landing. There are over 170 arriv-
nd departures of ferry boats every twenty-
hours, and these boats carry over 106,000
le into and out of the city. Street cars
rom this point to all parts of San Fran-
. The building is the headquarters of the
ornia Development Board and the Cali-
a State Mining Bureau, and the second
contains an elaborate exhibition of the
rces of the state. Extending along the bay
ı and south of the Ferry Building are the
lines of wharfage where may be found
from practically all parts of the world.
chief wholesale and manufacturing center
west of the wharf and south of Market
t.

e retail district is on Market Street and
ning parts of Geary, Kearney, Post, Stock-
nd Sutter streets and Grant Avenue. The
business center is at the intersection of
y, Kearney and Market streets. In the
'e formed by the intersection of these
ts is Lotto's Fountain, where outdoor mu-
stivals are held on Christmas Eve. With-
radius of two blocks are some of the most
sing business structures, including the San
cisco Stock Exchange, the United States
reasury and the building of the Standard
Company. In Union Square near by is a
ıment to Admiral Dewey. Hotel Saint
cis faces the square on the west.

e Civic Center, which begins at the inter-
ɔn of Market Street and Van Ness Ave-
nue, is surrounded by one of the finest groups of public buildings in the country. Here are the City Hall, the Municipal Auditorium, opera house, the museum, the State Building and the public library.

The great markets in which fruit, fish, vegetables and various other commodities are handled on a large scale form one of the distinguishing features of the city. The most important are the California Market, extending from California to Pine Street, and the Colombo Market on Dover Street.

Chinatown. In the heart of San Francisco is the foreign city, Chinatown. It occupies the section bounded by Kearney and Stockton streets and California and Pacific avenues, an area of ten city blocks, within which practically no whites dwell. Here the customs, rites and practices of the Chinese residents have full sway, excepting in slight modifications imposed by the United States government. Chinatown was destroyed by the great fire in 1906, and the old buildings have been replaced by modern structures. The chief interest is in the people, for here one may see China without crossing the ocean.

Other Buildings. In addition to the buildings to which attention has already been called there are many others deserving mention. First among these are the great hotels—the Palace, the Saint Francis and the Fairmont—hostelries

THE METROPOLITAN DISTRICT

1. Alameda
2. Berkeley City
3. Richmond City
4. San Rafael
5. Sausalito
6. San Mateo Co. Twp. 1

that are not surpassed by those in any other American city. The post office, a granite structure costing $5,000,000, survived the fire. The Hobart Building on Market Street, twenty-one stories high; the Pacific Building, one of the largest concrete office buildings in the world; the Humboldt Savings Bank Building, eighteen stories high; the Mutual Savings Bank Build-

ing; the Merchants Exchange Building; the Chronicle Building and the Hearst Building are all towering structures. The United States mint at Mission and Fifth streets is an imposing building designed in the style of the United States Treasury building at Washington. More gold has been coined in this mint since it was established than in any other in the country. The mint is open to visitors during certain hours every working day.

The principal churches include the First Congregational, the First Presbyterian, Saint Mary's Cathedral, Old Saint Mary's, Saint Luke's, Episcopal, and Temple Emanu-El. Mission Dolores, built in 1782 and restored in recent times, still retains a part of the old structure and is the oldest building in the city. Among the most attractive theater buildings are the Alcazar, the Columbia, the Cort, the Empress, the Orpheum, the Pantages and the Savoy.

Among the unique buildings are the Cliff House, jutting out into the sea near the Seal Rocks, on which sea lions can be seen at any hour in the day, and the Sutro Baths and Museum, a structure covering nearly three acres and containing the largest indoor swimming tanks ever built. Adjoining the baths are the Sutro Gardens, ornamented by many pieces of beautiful statuary.

Manufactures. In 1914 San Francisco was eleventh among the cities of the United States in its manufactures. The most important industries are meat packing, sugar refining, fruit canning and preserving, and the manufacture of machinery, glass and chocolate. Shipbuilding is an important industry, and one of the largest dry docks on the Pacific coast is located here.

Transportation and Commerce. Only one branch of the Southern Pacific Railway enters San Francisco. Oakland, across the bay, is the terminus of all the great transcontinental lines, but the excellent ferry service enables passengers and freight to reach the city without delay. There are regular lines of steamships plying between San Francisco and all the ports of the Orient and the Philippine Islands. Other lines are engaged in coastwise traffic and in South American trade, and the Panama Canal is increasing the ocean traffic between San Francisco, New York and other Atlantic ports, since it has shortened the ocean route between these cities by more than 7,000 miles. San Francisco has an extensive foreign trade.

Education. In addition to the public high schools, which are accredited by the University

Research Questions on San Francisco

(An Outline suitable for San Francisco will be found with the article "City.")

What, according to one writer, have been the chief causes of San Francisco's development of an "individuality and a versatility beyond any other American city?"

What are the great advantages of position which this city possesses?

Where does San Francisco rank among the great cities of the United States? (See list with article CITY.)

How does it rank among the seaports of the western coast?

What is the Golden Gate? Who named it? Give a brief description of it.

What two places in Europe, according to a distinguished Englishman, vie with San Francisco in beauty and advantage of position?

Locate these two places on a map of Europe, and see whether you can discover similarities between their situations and that of San Francisco.

What interesting form of animal life may be seen from the Cliff House in Golden Gate Park?

What distinction have the Sutro Baths among similar institutions?

Study the map of the city, and see whether you can tell why almost no railroads enter the city.

If you went to San Francisco on the Western Pacific, for instance, where would you leave the train? How would you reach San Francisco?

What shelters the city from the winds of the Pacific?

What animal, almost extinct except in zoölogical collections, may be seen in Golden Gate Park?

What is the Presidio?

What great exposition was held in this city? Where was it located?

How did the plan after which the buildings and grounds were laid out differ from that employed in most expositions?

What building has San Francisco that is 650 feet long?

What does its second story contain?

What foreign city exists within San Francisco? Why would you see practically none of the buildings there that you would have seen in 1905?

What important structure suggests in its architecture one of the buildings of the Federal capital? What is carried on in this building?

What is the oldest building in the city?

When was it built?

Who was the first man to enter San Francisco Bay?

What was the main object of the first comers to this region?

What was the first actual settlement made here?

To how many countries has this territory on which San Francisco is situated belonged?

When did it come into the possession of the United States?

What was the main cause of the very rapid development of this far western region?

What were the vigilance committees, and why were they necessary?

When was railway connection with the Eastern states completed?

of California and the Leland Stanford Jr. University, there is an excellent High School of Commerce. The city maintains a normal school for training teachers. The Cogswell Polytechnic College, the Wilmerding School of Industrial Arts, the California School of Mechanical Arts and the Lux School of Industrial Training for Girls are all institutions of a high order. The Conservatory of Music is widely known for its excellent work, and the universities mentioned above maintain professional schools of college grade in the city.

Population. Notwithstanding the disaster of 1906, San Francisco has had a steady increase in population. In the decade 1900-1910 its increase was from 342,782 to 416,912, and the official estimate of 1916 gave it 463,516 inhabitants. Like other large American cities San Francisco includes many different nationalities. By far the largest part of the population, however, consists of Americans, who are among the most wide-awake and progressive people of the country.

History. Some authorities believe that Sir Francis Drake entered San Francisco Bay some time between 1577 and 1580 (see DRAKE, SIR FRANCIS). The first entrance to the bay of which we have any record was made by Don Gaspar de Portola, governor of California, in 1769. The Spanish plan of colonization included three departments, the religious or mission, the military or presidio, and the civil or pueblo. The settlement of San Francisco began with Mission Dolores in 1776, the year of the adoption of the Declaration of Independence. A military post, the presidio, was established the same year. From its beginning the mission prospered and increased rapidly in numbers and wealth. In 1834 commercial interests began to control its affairs and from that date it declined. In 1836 the village of Yerba Buena was established on the bay about three miles from the mission. From this little business center San Francisco has grown to its present proportions.

Mexico, with California, became independent of Spain in 1832. The United States took possession of California in 1846, and the name of the town was changed to San Francisco the following year. The discovery of gold in 1848, at Coloma, in what is now El Dorado County, was the beginning of one of the most spectacular developments in American history. In 1849, $2,000,000 in gold was exported. San Francisco sprang from a town of 800 inhabitants to 10,000 in eighteen months. The worst and the best of men contended here for wealth. Buildings appeared like mushrooms, and the city was destroyed by fire five times in three years, 1849-1851. Crime became so flagrant that vigilance committees were organized to bring offenders to justice. San Francisco became a city in 1850 and the city and county were consolidated in 1856. The second great gold discovery, the Comstock lode in Nevada, came in 1859. In 1862 telegraphic communication was established with the Eastern states, and in 1869 the Union Pacific Railroad was completed, giving the city railway connection with the Atlantic seaboard. The foreign commerce, industries and population increased steadily from decade to decade until San Francisco, in 1916, was twelfth among the great cities of America.

An earthquake shock, which occurred on the morning of April 18, 1906, was followed by one of the most devastating fires known in history. In three days an area of four square miles in the heart of the city was reduced to ashes and a tangle of débris. Over 450 people lost their lives, and the loss in property exceeded $200,000,000. Measures for rebuilding the city on a grander scale and more substantial plan were at once perfected, and in less than ten years a new San Francisco had replaced the old. The city united with the state in extending to the United States government an invitation to have the Panama-Pacific-International Exposition held in San Francisco in 1915. The invitation was accepted and the exposition brought to the city thousands of visitors from all parts of the world (see PANAMA-PACIFIC-INTERNATIONAL EXPOSITION). W.F.R.

Consult Young's *San Francisco: A History of the Pacific Coast Metropolis;* Eldredge's *Beginnings of San Francisco.*

SANG'STER, CHARLES (1822-1893), a Canadian poet and journalist, one of the first of the native English-Canadian poets, and one who is credited with a considerable part of the national sentiment which resulted in Confederation. Beginning about 1860, when political conditions in the Canadas were at the worst, Sangster wrote many verses in which patriotism has a strong, if not always predominant, note. His poems were collected in two volumes, *The Saint Lawrence and Saguenay and Other Poems,* and *Hesperus and Other Poems and Lyrics.*

Sangster was born at Kingston, Ont. In his youth he was a newspaper editor at Amherstburg and later at Kingston, but in 1868 he accepted a position in the Postoffice Department.

For selections from his poems, see *Oxford Book of Canadian Verse.*

SANHEDRIN, *san he'drin,* the supreme council of the Jews, with authority over religious, civil and criminal cases. At the time of Christ it was made up of seventy-one members; they were presided over by the high priest and met daily near the Temple in Jerusalem. Jesus was tried before the Sanhedrin as a false prophet, and Peter, John, Stephen and Paul appeared before it on charges of religious error. After the fall of Jerusalem, in A. D. 70, the Sanhedrin declined in power and finally disappeared.

SANITARY SCIENCE. The purpose of sanitary science is to raise health standards, check disease and prolong life—in general, to make the world a safer and better place for the individual. Centuries ago epidemics of smallpox, cholera, the plague and similar diseases swept over countries and reaped harvests of countless victims because the great foe of these enemies of the human race—sanitation—was not understood. Sanitary science has to do with the ground on which houses are built, methods of ventilation, water supply, sewerage and drainage systems, quarantine, vaccination and other measures for preventing disease or checking its spread, and the personal habits of the individual. These various aspects of the subject are treated in these volumes under the headings listed below. They form a complete survey of the field of sanitary science.

Related Subjects. The reader is referred to the following articles:

Adulteration of Foodstuffs and Clothing	Health Habits
Antiseptic	Heating and Ventilation
Aqueduct	Hygiene
Baths and Bathing	Inoculation
Board of Health	Life Extension
Drainage	Mosquito
Fly	Reservoir
Food	Serum Therapy
Fumigation	Sewer and Sewerage
Garbage	Sewage Disposal on Farms
Health	Vaccination

SAN JACINTO, *ja sin' toh,* BATTLE OF, the final battle of the War for Texan independence, fought on the afternoon of April 21, 1836, near San Jacinto Bay, Tex. Santa Anna commanded a Mexican force of about 1,400, and the Texans, numbering about 740, were led by General Sam Houston. The Texans rushed to battle with the cry "Remember the Alamo," and speedily won a complete victory. Over 1,300 Mexicans were killed, captured or wounded, and Santa Anna was taken prisoner the following day. The Texan loss was only two killed and twenty-three wounded. See TEXAS, subhead *History;* ALAMO.

SAN JOAQUIN, *ho ah keen',* an important river of California, which has its source in a small glacier on the eastern slope of the Sierra Nevada Mountains. It flows southwestward, then in a northwesterly direction, traversing the fertile San Joaquin Valley, and meets the Sacramento River (which see) about sixty miles northeast of the Francisco, near its mouth on Suisun Bay. Its length is about 350 miles, 125 miles of which are in the mountains, and it is navigable throughout the year as far as Stockton, a distance of fifty miles; in winter and spring boats ascend about 200 miles farther. The valley of the San Joaquin, which is about 200 miles long and thirty miles wide, produces an abundance of grain and fruit, and is frequently called the "granary of California."

SAN JOSÉ, *ho sa',* the capital and largest city of Costa Rica, a republic in Central America. San José lies in a fertile agricultural valley, about midway between the eastern and western coasts, and is 3,868 feet above sea level. It is the principal station on the transcontinental railroad which has its Pacific terminal at the port of Punta Arenas, and its Atlantic terminal at the port of Limon. The city has many modern features, including macadamized streets and electric lights, and among its fine public buildings are a national library, a national museum, an Institute of Physical Geography, and one of the finest opera houses in Central America. It was founded in 1738 and, except at short intervals, has been the capital since 1823. Population, 1913, 34,784.

SAN JOSÉ, *ho sa',* CAL., the county seat of Santa Clara County, is a health resort and the chief city in the fine fruit region of the Santa Clara Valley. It is forty-seven miles southeast of San Francisco, seven miles south of San Francisco Bay, with which it has water connection, and on several branches of the Southern Pacific Railroad. The area exceeds eight square miles. In 1910 the population was 28,946; in 1916 it was 38,902 (Federal estimate).

San José is the seat of the University of the Pacific (Methodist Episcopal), the College of Notre Dame (Roman Catholic), a state normal school, and a number of private institutions. It has a fine stone Federal building, which cost $200,000, a courthouse, city hall, Hall of Justice, Hall of Records, Carnegie Library, Y. M. C. A. and Y. W. C. A. buildings and the county and private hospitals. At Alum Rock Park (1,000 acres), seven miles dist[illegible]

are mineral springs and a municipal natatorium. The famous Lick Observatory (which see) is on the summit of Mount Hamilton, twenty-five miles by road east of the city.

The chief of the varied and abundant crops of the fertile Santa Clara Valley are prunes, apricots, peaches, cherries, grapes, olives, wheat and barley. The city has fruit-packing and shipping establishments, fruit-canning and drying plants, foundries and machine shops, marble-cutting works and manufactories of baskets and boxes, leather and wine and malt liquors. The value of fruit annually exported is about $15,000,000.

Spaniards founded the pueblo of San José (Saint Joseph) in 1777, and twenty years later the mission of San José was built. It came into possession of the United States in 1846 and from 1849 to 1851 was the capital of California. The city suffered from shock and fire at the time of the great San Francisco disaster in 1906. J.T.B.

Consult Mars's *Reminiscences of Santa Clara Valley and San José.*

SAN JOSÉ, *ho sa'*, SCALE, the most destructive of the scale insects, commonly found on shrubs and fruit trees throughout the United States. The pest takes its name from that of San José, Cal., where it was discovered in 1880. It was believed to have been introduced on trees brought from China. The insect was not found east of the Rocky Mountains until three years after it was discovered in California, but by 1895 it had become widespread throughout the orchards of the Eastern states. At that time several of the European governments and those of Canada and South Africa prohibited the importation of fruits and plants from the United States to prevent the introduction of the insect.

The smaller an insect enemy, the more dangerous it is, because it is not discovered until it has made great headway. The San José scale is difficult to fight because of its minute size and its amazingly rapid reproduction. The largest insects are not larger than the head of a pin, and it has been estimated that one female scale may produce over 3,216,080,000 young insects a year. The branches of infected trees are literally powdered with their minute bodies, and as they exude a gray, scaly wax, the plants look as if coated with ashes.

The danger of the pest is increased by the great number of its food plants, which include orchard and small fruits, the members of the rose family, the pecan, the English walnut, the elm and other trees. The fruits of infected apple and pear trees show a reddish discoloration of the skin and are often rough, pitted and distorted in shape, or cracked. A full-grown apple tree may resist these insects for several years, but a young peach tree is often killed in two seasons.

The pest is spread by infected nursery stock; the scales are scattered by the wind and are carried on the feet of birds and flying insects. The Chinese ladybird beetle is a natural enemy of the pest, and the chalcidid fly destroys the adult scales. A mixture of lime, sulphur and salt, known as "California wash;" whale oil or fish oil soap containing potash lye; kerosene soap or crude petroleum, and hydrocyanic acid gas are used to destroy the insects. L.B.

Consult *Farmers' Bulletin No. 650,* United States Department of Agriculture; Johnson's *Fumigation Methods.*

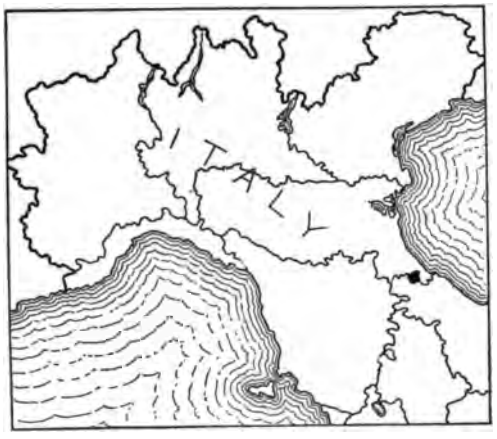
SAN JUAN, *hwahn,* the capital, largest city and chief seaport of Porto Rico. It is situated on a coral islet off the northern coast of the main island, the two being connected by the Bridge of San Antonio and a fortified causeway. Picturesque walls, 250 years old, surround the city, and the Morro Castle occupies a promontory on the western end. The deep bay between the city and the mainland provides one of the best harbors in the West Indies. San Juan was the seat of the Spanish provincial government, and has numerous fine buildings, including the customhouse, city hall, a cathedral, a large Dominican convent, a $100,000 Carnegie Library, a military hospital and barracks. The city is an important center of tobacco manufacture. The fortifications of San Juan were bombarded by the United States fleet under Admiral Sampson in May, 1898. Population, 1916, 48,716 (Federal estimate). See PORTO RICO.

SANKEY, *sang'ki,* IRA D. (1840-1908), a gospel singer whose career was linked with that of Dwight L. Moody (which see).

SAN LUIS POTOSI, *sahn loo ees' po toh se',* a beautiful city in Mexico, the capital of the state of the same name. In population it ranks fourth among the cities of the republic, being surpassed by Mexico City, Puebla and Guadalajara. It is the seat of a United States consul. Almost hidden by luxuriant gardens, San Luis Potosi is situated on a plateau 6,200 feet above sea level, about 215 miles northwest of the City of Mexico. Many beautiful plazas, a magnificent cathedral and handsome public buildings ornament the city. Originally it became impor-

tant through the famous silver mines of San Pedro, in the vicinity, but these have been practically abandoned. At the present time the city has a good trade in pottery, mineral products and hides, and manufactures furniture, woolen goods, flour, soap, cigars and other commodities. The place was a center of the revolutionary disturbance beginning in 1910, and was captured by the Constitutionalists in 1914 (see MEXICO, subtitle *Government and History*). Population in 1914, 82,946.

SAN MARINO, *sahn mah re'no,* the oldest republic in Europe and one of the smallest nations in the world, is situated in a mountainous district of Northeastern Italy, about twelve miles southwest of the port of Rimini, on the



LOCATION MAP
The small black area in the east is the little republic.

Adriatic Sea. It has an area of about thirty-eight square miles, and it is said a cannon in the capital cannot be used to salute distinguished visitors for fear of committing an act of violence against its neighbor state, for the projectile might fall outside its boundaries. The capital, also known as San Marino, is situated at the summit of Monte Titano, about 2,650 feet above the sea. It is a small, old-fashioned town, whose streets, paved with flagstones, are so narrow and crooked that vehicles of any kind are used but little. The buildings as well as the customs of the town have remained almost unchanged since medieval times. In the public square, the social center of the town, are great cisterns filled with rain water, the only source of water supply. The chief occupations of the people are the raising of cattle and the making of wine. Stone is exported. The little republic issues its own postage stamps and copper coins.

The legislative assembly of the republic Great Council of sixty members, elected popular vote. Every six months two execu officers, called Regents, are selected from council members, and a smaller executive c cil of twelve members is chosen from number every year. The republic has no lic debt. A treaty of friendship, negoti with Italy in 1907, was renewed in 1914, San Marino followed Italy in declaring against Germany in the War of the Na (which see). The town of San Marino has in existence since the fourth century. Urban VIII formally acknowledged the pendence of the state in 1631. Populatio the republic in 1910, 10,489. M

SAN MARTIN, *sahn mahr teen',* Jose (1778-1850), a distinguished general and c pion of South American independence, o the most prominent figures in the wars v freed the countries of South America fro power of Spain. He was born in Argentin educated in Spain, where he had his first of military service in a war with France. hearing that the Spanish colonies in S America had rebelled, he hurried to Bu Aires, organized the famous Mounted G diers, and was given command of a larg vision of the patriot forces. In Chile he s two brilliant victories over the Spanish a at Chacabuco (1817) and Maipo (1818), v brought about Chilean independence.

Later he helped the Peruvians to win liberty, and in 1821 was made Protect Peru. He used his authority to accom some important reforms, both educational political; but in the following year, alth the idol of the people, he gave up the dict ship to Simon Bolivar (which see) and le cretly for Europe. He later revisited his n country to find the republics warring a themselves, and as he had sworn never to in a civil war he immediately returne France. There he lived quietly and almo poverty until his death. L.J

SAN SALVADOR, *sahn sahl va dohr',* capital of the republic of Salvador, in Ce America, was almost wholly destroyed in 1917, by an earthquake and volcanic eru The site of the city is in a pleasant v twenty-five miles from the Pacific Ocean. region has for centuries been subject to qu for in the vicinity there are eleven great canoes. San Salvador was twice dest previous to 1917—in 1854 and in 1873. time the people rebuilt their city, and aft

disaster rebuilding plans were again
ed.

the capital of the most densely populated
blic of Central America (see SALVADOR),
Salvador was an important business and
ay center. It had three banks and a num-
of manufacturing establishments, and car-
on a thriving trade in coffee, tobacco, rub-
sugar and other agricultural products. The
was one of the most attractive in Central
rica, with picturesque adobe houses, in a
ng of luxuriant growths of fruit trees and
s, spacious parks and tropical gardens.
ng the many fine buildings were the na-
l palace, where the legislature held its
ons, a handsome university building, the
ber of commerce, the Roman Catholic
edral and an astronomical observatory.
city maintained several hospitals and a
ber of charitable institutions. At the time
e last disaster its population was estimated
75,000. Though the people were rendered
eless, it was reported there were few lives

N'SKRIT LANGUAGE AND LITERA-E. Sanskrit was the sacred and literary
uage of ancient India. It is divided into
periods, Old Sanskrit, called Vedic Sanskrit
mply Vedic, in which the *Vedas* were writ-

ाकौ वृक्षे वसतः *b*देवो वदति
कमर्थम्पितरम्पुत्रो न स्मरति

SPECIMEN OF SANSKRIT
anslation: (*a*) Two crows dwell in the tree;
The god speaks; (*c*) Why does the son not
mber the father?

and classical Sanskrit, the literary remains
hich are chiefly on subjects other than re-
us. The time of the introduction of San-
into India cannot be even approximately
rn, but 1500 B.C. is the date generally
ned. For a period, uncertain in its length,
s the common speech of the people as well
e literary language, but by the first or sec-
century B.C. it had become merely classical,
eans of communication, both written and
en, between the learned, but entirely dis-
ed as a language of the people. In this
or less artificial and classical form it exists
ly.

Position of Importance. Sanskrit may not
ismissed by the student of languages with
eless word simply because it has no present
existence. Since it came to the knowledge
uropeans in the latter half of the eight-
eenth century it has exercised a profound influence on the scholarship of the world. Comparative philology, comparative mythology and comparative religion are the direct outgrowth of its study. For Sanskrit, by the very fact that it has survived through so many centuries as a merely formal speech, has not been subject to the constant changes which creep into the common speech of a people, and consequently preserves in purer form than any other of the Indo-European languages the characteristics of the common stock from which these all sprang. The real understanding of the development of such important languages as Greek, Latin, English and German has been made possible, therefore, largely by the possession of Sanskrit as a means of comparison.

Developed a Great Literature. Interest in Sanskrit is not due entirely to its linguistic value, for it possesses a literature well worthy of study for its own sake. In a wider sense this literature includes the *Vedas,* the sacred Hindu books which constitute the oldest work in any Indo-European language. Sanskrit literature proper, as distinguished from the Vedic, is entirely secular, as stated above, and its greatest monuments are the epics known as the *Ramayana* and the *Mahabharata.* Other epics less noteworthy than these exist, together with lyric and didactic poetry, narratives, and even dramas. Though the Hindus claim a great antiquity for their drama, there seems no real reason for placing its beginnings before the fifth or sixth century of the Christian Era. Nor is it possible to state that it was entirely a product of that country, many scholars seeing in it distinct traces of Greek influence. In general, the themes are taken from Hindu legend or history, and the characters are types rather than individuals.

Most interesting of all to students, however, are the beast-fables and fairy tales, for in these is evident a very close connection with such narratives in European languages. India seems to have been one of the earliest homes of the fable, and practically every fable *motif* which is found in European fables exists in some form in Sanskrit literature. Many of these Hindu tales are built on the story-within-story plan which the *Arabian Nights* has made familiar. Some of the stories of that famous book may be traced to their source in the tales of India, and many of the legends and tales of medieval Europe are of the same origin. A.MC C.

Consult Perry's *Sanskrit Primer;* Reed's *Hindu Literature, or the Ancient Books of India.*

SAN'TA AN'A, in Spanish, *sahn'tah ah'nah,* CAL., the county seat of Orange County, is in the southwestern part of the state thirty-three miles southeast of Los Angeles and ninety-two miles northwest of San Diego. It is on the Atchison, Topeka & Santa Fe and Southern Pacific railroads, and has electric service to the beaches and to Los Angeles. In 1910 the population was 8,429; it was 10,627 (Federal estimate) in 1916. The area is nine square miles. Prominent buildings include the fine county courthouse, city hall, a number of churches of architectural merit, the Polytechnic High School and Carnegie Library. Santa Ana has sugar-beet factories, packing houses, a cannery and an iron and brass foundry, and there is an important trade in fruit. A settlement made here in 1869 was incorporated as a city in 1886.

SANTA ANNA, *sahn'tah ah'nah,* ANTONIO LOPEZ DE (1795-1876), a Mexican soldier and statesman, who is closely associated with the early, varying fortunes of the Mexican republic, was born at Jalapa, in the province of Vera Cruz. Entering the colonial (Mexican) army of Spain as a cadet in 1810, he served as a supporter of the Spanish government till 1821, when he joined Iturbide in the effort to throw off the sovereignty of Spain. Iturbide made Santa Anna brigadier and governor of Vera Cruz, and this office he held until 1835.

Meanwhile, he figured variously as a supporter of Iturbide, then as his conqueror, and later as a follower of Guerrero, who overthrew President Pedroza. In 1829, as Minister of War and commander-in-chief of the army, he defeated the Spanish army which was attempting to restore the power of Spain, and ended the effort to reëstablish European authority in Mexico. His next move was to overthrow the government of President Bustamente, and on November 12, 1832, he defeated the latter at Casas Blancas. In the following February Santa Anna was chosen President, and though previous to this time, he had figured as a supporter of federalism, he forthwith abolished the Federal constitution and entered into relations with the monarchists. Insurrections followed and in 1835 Texas decided to revolt from Mexican authority and establish its own government. Santa Anna hastened to suppress this movement, attacking San Antonio early in 1836 and capturing the Alamo in March. But the Mexican army was defeated the next month at San Jacinto by Gen. Samuel Houston, and Santa Anna was taken prisoner. The Texans agreed to spare his life, and he left the country.

In November, 1838, Santa Anna defended Vera Cruz against the attack of the French, losing a leg in the battle, but increasing his popularity. In 1841 he was made military dictator, ruling thus till June, 1844, when he was elected constitutional President. In November, however, a rebellion was led by Paredes, and Santa Anna was defeated and banished. When war with the United States broke out in 1846, he was recalled and placed in command of the army. After the occupation of Mexico by Gen. Scott, Santa Anna resigned. In 1853, he was once more reënstated at President, but at the end of two years was again overthrown, and took refuge in Cuba. During the French invasion of Mexico in 1864 he attempted to return home, but was not permitted to do so until after Maximilian was killed and Juarez had died. He died in Mexico City in obscurity.

Santa Anna had a longer public career than any other Mexican politician excepting Porfirio Diaz. He was personally a man of great courage and an able soldier, but he was a master of intrigue, and of unstable principles.

Read TEXAS, subhead *History,* in addition to reference above. Santa Anna's relations with the United States are noted in the routine history of the Mexican War, beginning with the causes of that struggle. Benton's *Thirty Years' View* throws light on his character.

SANTA BARBARA, *san'ta bahr'ba ra,* CAL., the county seat of Santa Barbara County, 104 miles northwest of Los Angeles. It is on the Santa Barbara Channel opposite the islands of Santa Rosa and Santa Cruz, and is ideally located in a valley of the Santa Ynez Mountains opening out to the sea. Owing to the shelter of the mountains and the effect of the ocean, the climate is mild and healthful. The natural vegetation has been enriched with specimens from every part of the world; roses grow in profusion. The city is served by the Southern Pacific Railroad. In 1915 its population was 14,332, an increase of 2,673 since 1910.

The surrounding region is agricultural, and the city has stock-raising and fruit-growing interests and large lemon-packing establishments. Near by is the old Santa Barbara Mission, founded by Junipero Serra in 1786, which, with its refectory, dormitory and lovely old garden, is still occupied by Franciscan monks. Prominent features are the Federal building, completed in 1914, a Carnegie Library (built in 1916), the State Normal School of Manual Arts, Saint Anthony's College, a courthouse, city hall, Saint Francis and Cottage hospitals, a Y. M. C. A. building, hotels and parks.

Governor Felipe established a presidio (military post) here in 1782. It was incorporated as a city about 1850. In 1915 the commission form of government was adopted. The water system is owned by the municipality. C.M.G.

SAN'TA CLAUS, *klawz,* the children's favorite name for good Saint Nicholas (see NICHOLAS, SAINT).

SANTA CRUZ, *sahn'ta krooz,* CAL., the county seat of Santa Cruz County, is a health and pleasure resort on the west coast of the state, eighty miles by rail southeast of San Francisco. It is located at the mouth of the San Lorenzo River and on the north shore of Monterey Bay, and is served by the Southern Pacific and Ocean Shore railroads and by several steamboat lines. The area of the city is nine square miles. In 1910 the population was 11,146; it was 14,594 (Federal estimate) in 1916.

The city is situated on a slope rising gradually from the bay to hills north of the city, and among its attractions are an excellent beach, drives along the cliffs, and Sequoia Park, a celebrated forest of giant redwoods a few miles away. Santa Cruz has a city park of 200 acres, a hall of records, a courthouse, city hall and public library. The chief manufactures are gunpowder, lime, cement, asphalt, glue, leather and wood products. Fruit growing is the leading industry of the surrounding country. Santa Cruz Mission was founded here in 1791. The city was incorporated in 1876, and has adopted the commission plan of government.

SANTA FÉ, *sahn'ta fay,* capital of the Argentine province of Santa Fé, is situated on a channel of the Parana River, not far from the mouth of the Salado, and about 300 miles northwest of Buenos Aires. It is an important railway center, having connections with Rosario, Cordoba and Tucuman. The city is modern in appearance and possesses a Jesuit college, a university, substantial government buildings and a cathedral. Shipbuilding is an important industry, and there is a prosperous export trade in wool, lumber and cattle. Population in 1914 (including suburbs), estimated, 48,600.

SANTA FE, *san'ta fay,* N. M., state capital and county seat of Santa Fe County, situated at an altitude of 7,000 feet at the base of the Sangre de Cristo Range, in the north-central part of the state. It is entered by a branch line of the Atchison, Topeka & Santa Fe from Lamy, eighteen miles southeast, and by the Denver & Rio Grande and the New Mexico Central railroads. Las Vegas is eighty-three miles east by rail, and Albuquerque is eighty-six miles southwest. The population, among which are many Mexicans, was 5,072 in 1910.

With the exception of Saint Augustine, Fla., Santa Fe is the oldest European settlement within the present limits of the United States. It was founded by Spaniards in 1606. The site is said to be that of a prehistoric Indian pueblo. In the vicinity, in Pajarito Park, are remains of cliff, cave and communal dwellings. The oldest streets are narrow and crooked, bordered by one-story adobe houses. In the center of the town is the Plaza. Facing it on the north is a building called the "Palace," an old adobe one-story structure a block in length, built early in the seventeenth century. It was the home of Spanish, Mexican and United States governors until 1909. While governor of the territory (1878-1881), General Lew Wallace finished writing *Ben Hur* in the "Palace." The building now contains the historical museum of the Historical Society of New Mexico, the School of American Archaeology and the New Mexico Museum of Archaeology.

Other features of interest are San Miguel Church (like the "Palace," an important relic of the Spanish era), the Cathedral of San Francisco, the Rosario Chapel, ruined earthworks of Fort Marcy, north of the city, ruins of the Garita, once a Spanish fort, and long the site of a cemetery, the national cemetery, and an old adobe house said to be the oldest dwelling house in America. The prominent modern buildings of the city are the state capitol of brick and stone, completed in 1900 at a cost of $200,000, the Federal building, county courthouse and the Scottish Rite Masonic Cathedral. The city also contains the state penitentiary.

Santa Fe is mainly a residential town, with religious and educational interests. There are a number of modern churches and Saint Michael's College, the Loretto Convent, Allison Mission School, Mary E. James Mission School, school for the deaf and dumb, the government and Saint Catherine's Indian schools and the School of American Archaeology, which conducts a summer school for research among prehistoric Indian ruins. Santa Fe contains the state library and a city library, and has a number of hospitals and sanitariums treating a large number of patients who are attracted by the fine climate.

The old Santa Fe trail from Independence, Mo., to Santa Fe, N. M., established early in the nineteenth century, was an important trade

route between the East and West. The city is a distributing center, has some trade in filigree jewelry, Indian blankets and wool, and has stock-raising and mining interests. The Spaniards who settled here in 1606 worked gold and silver mines in the neighborhood. The settlement was captured by Indians in 1682, and they occupied it until 1693, when it was retaken by the Spanish. United States troops under General S. W. Kearny took possession in 1846. Five years later it became a city and was made capital of the Territory of New Mexico. N.E.S.

Consult Powell's *Historic Towns of the Western States.*

SANTIAGO, *sahn te ah'go,* the largest city of Chile, the capital of the republic and also of the province of Santiago, is picturesquely situated in a valley between the Andes and the Chilean coast range. It is sixty-eight miles southeast of Valparaiso, its port on the Pacific, and is built on the bank of a small branch of the Maipo River. Among several hills within the city itself is Santa Lucia, a steep elevation of red porphyry which has been converted into a public pleasure ground. On this crag the early Spanish settlers were besieged for six years by savage Araucanian Indians. Though the city lies in an arid region, by means of irrigation there are luxuriant growths of trees and flowers, and the Santa Lucia is but one of several large parks. Running through the center of Santiago is one of the handsomest boulevards on the South American continent, with rows of poplars on either side and many attractive statues. As a whole the city has broad, well-paved streets, and the newer buildings and private homes compare favorably with those of other large cities of the western world.

Among the conspicuous structures are the mint, the Hall of Congress, an imposing opera house, a cathedral and the buildings of the University of Chile, founded in 1743. Other educational institutions include the National Library, the National Museum, a botanical garden, an observatory and several professional schools. The city has excellent electric street-car service, a modern water-supply system, and railroad connections with Valparaiso, Concepción and Buenos Aires. In 1914 it had a population of 397,941, which is greater than that of any other city on the Pacific slope of the two Americas, with the exception of Los Angeles and San Francisco. The city suffered severely from a great earthquake in 1906. H.M.S.

SANTIAGO, Battle of, a naval battle fought off Santiago de Cuba, on July 3, 1898, during the Spanish-American War (which see). The United States fleet, commanded by Sampson and Schley, was unable to enter the harbor on account of strong fortifications, and stood guard before the entrance to prevent the escape of the Spanish fleet under Admiral Cervera. On July 3 the fleet attempted to make a dash from the harbor, but was pursued by the American squadron, and after a running fight six Spanish boats were destroyed or forced ashore. Admiral Cervera and over 1,300 officers and men were taken prisoners. The loss of life on the Spanish vessels was large, but only one was killed and only ten were wounded among the men of the American fleet.

SANTIAGO DE CUBA, *sahn te ah'go de koo'bah,* a seaport of the island of Cuba, capital of the province of Oriente. In size and commercial importance it ranks next to Havana. In 1914 Santiago had a population of 62,358, as compared with 355,870 for Cuba's largest city. The town is situated on the Bay of Santiago, on the southeastern coast, and is 470 miles directly southeast of Havana, with which it is connected by railway. Its fine, deep harbor is five miles in length and has an average width of one and one-half miles. It is a good example of a landlocked harbor, the opening into the Bay of Santiago being in one place only 200 yards wide.

The city is situated on a slope at the base of the Sierra Maestra Mountains. The main business center is the Plaza de Céspedes, an open square around which are some of the principal buildings, including the cathedral and the municipal building. The streets of the city and all sanitary conditions were very unsatisfactory until Cuba, with the help of the United States, became an independent republic, and American capital made paving and other improvements possible. There are now in the city modern hospitals, a theater and a market. Most of the private dwellings are one story high and crudely made, but they are often made attractive by beautiful flower gardens.

Santiago is an important shipping center, exporting from the rich territory of Oriente a great deal of iron ore (50,000 tons to the United States each month) and other minerals, such as copper and manganese. The agricultural exports are sugar, coffee and tobacco. The iron mines of the district are very rich and employ over 4,000 workmen. Some of the ore is worked up at home in iron foundries.

the Spanish-American War (which see) lities centered at Santiago, because the ish fleet was stationed in the harbor (see TIAGO, BATTLE OF). The city was attacked merican land forces under General Shafter, it capitulated on July 14, 1898, eleven days the destruction of the fleet outside the or.

NTO DOMINGO, *sahn'toh doh ming'go,* **AN DOMINGO** (more correctly the DoICAN REPUBLIC), is the eastern and larger e two republics on the island of Haiti (see , page 2662). Its neighbor, the republic aiti, occupies but one-third of the island. o Domingo has an area of 18,045 square s, which is a little greater than the comd area of Massachusetts and Vermont, and as an estimated population of 708,000 3). The people are mainly a mixed race of pean, African and Indian blood, but there in addition a number of Spanish creoles, in the capital city are found many Turkish Syrian dry-goods traders. Spanish is the ailing language, but in most of the towns ish is understood. The capital and largest Santo Domingo (described under its title), on the southern coast at the mouth of the na River. It has an estimated population 5,000; other municipalities having 10,000 more inhabitants are Santiago (12,000), ta Plata (10,000) and San Pedro de Ma- (10,000). The island was one of the first e claimed by Spain, following its discovery Columbus.

nto Domingo is governed under a constitu- adopted in 1844, which has been several s revised. The legislative power is vested Congress of two houses. The upper cham- or Senate, has twelve members, and the r, or Chamber of Deputies, twenty-four bers, one Senator and two Deputies being ed from each province. Senators are en for six-year terms and Deputies serve our years. The executive department con- of a President chosen by an electoral col- for six years, and a Cabinet composed of President and seven Ministers, each one of n heads a department. There is no Vice- ident, Congress selecting a successor to the ident in case of his death. Each of the inces is administered by a governor who pointed by the President, and the govern- n turn appoint various local officials. The recognizes the Roman Catholic as the al religion, but religious liberty prevails. ary instruction is free and is nominally compulsory, and the state also maintains several technical, normal and high schools. There are in the republic approximately 600 schools. In 1912 the National Bank of Santo Domingo was founded, and there are branches of the Royal Bank of Canada at Santo Domingo city and at Pedro de Macoris.

Customs duties are the chief source of revenue. The United States gold dollar is the monetary standard. Over three-fifths of the trade is with the United States, but in normal years Germany and the United Kingdom are

HOUSE OF COLUMBUS

Ruins of a house built in 1509 by Diego Columbus, son of Christopher Columbus, in Santo Domingo. It is the oldest structure in the western hemisphere erected by white men.

important buyers and sellers. The chief exports are sugar and cacao, with leaf tobacco, bananas, coffee, hides and skins, woods and beeswax next in order. Cotton goods, iron and steel manufactures, foodstuffs, chemicals and drugs, agricultural machinery and other manufactured products are imported. The principal ports are Santo Domingo, Puerto Plata and Sánchez. Interior facilities for communication and transportation are as yet inadequate, but the construction of roads and of railway lines is being pushed as rapidly as possible. In the republic there are in operation about 175 miles of railroad, besides 250 miles of plantation lines; there are over 700 miles of telegraph.

The Dominican Republic was proclaimed in 1844, and in 1865 its independence was recognized by Spain. The progress of the state has been hindered by political unrest, and because of the enormous debts and obligations to subjects of foreign nations incurred by the little nation, the United States assumed charge of financial affairs in 1905, according to the provisions of a friendly treaty. A serious revolt was quelled by United States intervention in 1913, and another uprising, in 1915, made necessary the dispatch of American war vessels to Dominican waters.

In the spring of 1916 the Dominican Congress voted to impeach President Enrique Jiménez for alleged violation of the constitution, and as a result of this action the garrison at Santo Domingo city revolted. To prevent civil war United States marines were dispatched to various parts of the republic, and in November a military government was proclaimed by the commander of the American marines at the capital. Martial law was to be in force until complete order was restored and a stable government assured. In June, 1917, Santo Domingo severed diplomatic relations with Germany, and proclaimed that its sympathies were with the United States in the War of the Nations. B.M.W.

For physical features, early history and climate, see HAITI. Consult Ober's *In the Track of Columbus.*

SANTO DOMINGO, the oldest existing European settlement in the New World, was founded in 1496 by Bartholomew Columbus, brother of the illustrious discoverer. It is the capital city of the republic of Santo Domingo, which occupies the eastern part of, and shares with the republic of Haiti, the second largest island of the West Indian group (see HAITI). Santo Domingo city is a seaport on the southern coast of the island, at the mouth of the Ozama River. The place, even at the present time, is typically Spanish. About it is an old wall used in early days as a defense against the raids of pirates and island natives. Most of the inhabitants dwell in thatch-covered cottages, but the picturesque ruins of great stone mansions tell a story of former grandeur. The streets are straight, but narrow and unpaved. One of the most interesting buildings is a large Gothic cathedral, where Columbus and his son Diego were formerly buried (see COLUMBUS, CHRISTOPHER). In the principal city square is a statue of the navigator. In the article SANTO DOMINGO, above, is an illustration of the ruins of the old Columbus home, erected by Diego.

Santo Domingo is important commercially as a center for the export of coffee and sugar. The harbor is not naturally well protected, but it has been improved by the erection, at the entrance, of a jetty and a sea wall. In 1913 a large concrete wharf was constructed. Estimated population, 25,000.

SANTOS, *sahN'toosh,* one of the busiest seaports in South America, is situated in the Brazilian state of São Paulo on the Atlantic coast, 200 miles southwest of Rio de Janeiro and twenty-five miles directly southeast of the city of São Paulo, of which it is the port. S is the first port in the world for the exp coffee, shipping out the vast output of the of São Paulo. The wide, deep bay on the city is located provides a harbor whic accommodate the largest vessels, and sums of money have been spent on imp ments, including a wall of stone and ce along the water front. Railway connecti had with the interior by way of São I (which see). Santos is an attractive city many fine public buildings, but is situated region naturally unhealthful. Epidemics, ever, have been checked to some extent by construction of a good drainage system, and population has greatly increased. Popula 1914, estimated, 90,000.

SANTOS-DUMONT, *sahn'tohs du ma* ALBERTO (1873-), a French aeronau leader in the development of the flying chine, was born at São Paulo, Brazil. He ceived his education in France, and after father's death resided in Paris. His first experiment in flying was made in 1898 in a spherical balloon. Soon he had perfected a dirigible balloon, but his first trial with this ended in failure. In 1899, with another balloon he made a long, successful flight, which included the encircling of the Eiffel Tower, proceeding from Vaugirard to Bagatelle.

SANTOS-DUMONT
In the early days of navigation he made his n famous, but he was eclipsed by the Amerk the Wright Brothers and tiss, and by the French Blériot and Nieuport.

Santos-Dumont won the Henri Deut prize of 100,000 francs, in 1901, for his trip f the Aero Club around the Eiffel Tower back, which he made in twenty-nine and half minutes, the time set for the flight b one hour. The following year he attem to cross the Mediterranean, but an acci sent both himself and his balloon into the of Monaco. He received the Chevalier Le of Honour in 1904 and the Officer's Cros 1909. His account of the work accomplishe found in his volume, *My Airships: A Stor My Life.*

FRANCISCO, *souN frahN seesh'koo,* or **FRANCISCO,** a river of Eastern Brazil. s in the state of Minas Geraes and flows ast, then eastward, forming the boundary en the state of Bahia and Pernambuco; n turns to the southeast, finding an outlet e Atlantic Ocean 1,800 miles from its . Navigation on this great river is in- ted in several sections. As it leaves the ains in Minas Geraes it plunges over falls pids; for 1,000 miles of its middle course broad, navigable stream, but 200 miles the Atlantic it again becomes turbulent, makes its way over a series of rapids and nificent cataract called the "Niagara of ." Beyond this the river valley becomes p, narrow canyon, and ocean ships can ate only the last 135 miles of the stream. portation along the unnavigable portions river is by railroad.

NE, *sohn,* a river in the east of France, in the Faucilles Mountains, in the de- ent of Vosges. It is the most important n of the Rhone, which it joins at Lyons. n-sur-Saône, the second largest industrial f Burgundy, is also on its banks. The is 300 miles in length, and is navigable ht vessels for 232 miles. It is connected the Seine, the Meuse, the Moselle, the and the Rhine by canals. The ancient name of the river was *Arar.*

PAULO, *souN pou'loh,* third in size uth American cities, ranking next to s Aires and Rio de Janeiro. It is one of 's most rapidly-growing and prosperous unities, and has the reputation of being f the cleanest cities in the two Americas. ty in the New World is better built or led with more beautiful public buildings re attractive tree-lined avenues. Situated t the boundary between the tropics and uth temperate zone, twenty-five miles in ct line from the sea and nearly 3,000 feet it, São Paulo is as well suited for the nce of white men as any spot in South ca.

city owes its progress to the wealth of eat state of the same name, of which it is pital. From this state is shipped more alf the world's coffee, through the port tos, twenty-five miles southeast (see SAN- The city of São Paulo is the railway cen- the state, and has railway connection ts port, with Rio Janeiro on the north- Buenos Aires on the southwest and the terior states of Matto Grosso, Goyaz and Minas Geraes. A map of the new railroad to Matto Grosso, which opens a very rich territory for the merchants and manufacturers of São Paulo, appears in the article BRAZIL. Because of the territory which the city serves, it is already the greatest manufacturing center in Brazil.

Though São Paulo was founded in 1554, it was the home of only 23,000 people in 1872. Between 1890, when its number was only 65,000, and 1893, the population doubled; in 1911 it was 450,000.

SAP, in botany, a juice that circulates in plants as blood does in animals. Sap is sometimes called the "blood of the plant." As the animal has impure and pure blood, so does the plant have *crude* and *eleborated* sap. The crude sap consists of water in which are dissolved the elements of plant food taken in from the soil by the roots. The elaborated sap contains this food and other elements of nutrition received from the atmosphere in a digested state ready to nourish the plant.

Circulation of Sap. The crude sap is taken up by the roots, and it ascends to the branches and leaves. In the leaves it loses a great part of its water, which passes into the air. In the cell of the leaf, under the action of sunlight, the food elements taken in by the roots undergo a change which fits them for nourishing the plant. In this process the crude sap is transformed into elaborated sap (see LEAVES, subhead *The Work of the Leaf*). The elaborated sap is usually thicker than the crude. It moves inward from the leaves to the branches and down the branches to the main stem, and down that to the roots.

The circulation of sap is most easily understood by studying it in a tree. The trunk of a tree has two kinds of wood—a layer of light colored, soft wood next to the bark, known as the *sapwood,* and a center of darker, heavier wood, sometimes called the *heartwood.* The crude sap ascends through the sapwood. The heartwood has ceased to grow, but in a sound tree it contains more or less sap. The elaborated sap descends between the sapwood and the bark, leaving a thin coat which resembles mucilage and which in due time becomes the new layer of wood for the season. In some trees, particularly the willow, the hemlock and the elm, this layer so loosens the bark that in early summer it is easily stripped from the tree. In the spring, boys make use of their knowledge of this fact in stripping the bark from willow twigs and making whistles.

Economic Uses. Many plants yield sap of economic value. The sugar of commerce is made from the sap of the beet and the sugar cane, and from the sap of the sugar maple syrup and sugar are obtained. Certain drugs, of which opium from the juice of the poppy is a good example, come from the sap of plants. Some plants yield fluids which are not true sap from the botanical viewpoint, that are also of great value. Of these the juice of the rubber tree, from which most of the world's rubber is made, and the gums and resins are the most valuable in the arts.

Related Subjects. The reader is referred to the following articles in these volumes:

Leaves	Rubber and Rubber
Opium	Manufacture
Resins	

SAPAJOU, *sap'a joo,* a group of American monkeys which are among the most intelligent of those inhabiting the New World. The largest are over forty inches in length, including twenty inches of tail. The monkeys that are carried about the city streets by organ grinders are usually sapajous. In South America the Indians capture them by shooting poisoned arrows, the substance used being curare. The captured monkeys are then given salt, which overcomes the effect of the poison. Among the important kinds of sapajou are the *white-fronted,* found in the forests near the sources of the Amazon River, and known by their white forehead and light brown color; the slender *spider* monkeys, occurring in the region between Southern Brazil and Central Mexico, and remarkable for their agility; and the *weepers,* or *capuchins,* which have the hair arranged on the head like a cowl, or friar's hood. In general, these monkeys are tree dwellers and live chiefly on insects and fruit, though eggs, young birds and reptiles are sometimes eaten. South American Indians hunt them both for their flesh and their fur. See MONKEY.

SAPPHIRE, *saf'ire,* a beautiful, transparent blue gem, ranking next to the diamond in hardness, and approximately equal to that stone in value. Sapphires vary in color from pale blue to deep indigo, but the most valuable stones have the tint of the cornflower. Yellow and white specimens, with the blue distributed in spots, are not uncommon. The sapphire is a variety of corundum and is of about the same composition as the ruby, though somewhat harder than the latter. The chief sources of the gem are Siam, Burma, Ceylon, Kashmir, Australia, North Carolina and Montana. The latter state supplies the greater part of product for the American market, and one the richest mines in the world is near the of Great Falls. The museum of the Botani Garden of Paris contains a fine collection sapphires. The gem is the birthstone for S tember. Its exceeding beauty is suggested a passage from Milton's *Paradise Lost,* wh the stars are compared to sapphires:

> . . . . . now glowed the firmament
> With living sapphires; Hesperus, that led
> The starry host, rode brightest.

Consult Kunz's *The Curious Lore of Precio Stones;* or his *Gems and Precious Stones of Nor America.*

Related Subjects. The reader is referred the following articles in these volumes:

Birthstones	Diamond
Corundum	Gems

SAPPHO, *saf'o,* a celebrated Greek ly poetess who lived in the seventh and sixth ce turies B. C. She spent most of her life in L bos, and was called the "Lesbian nightingal As head of a coterie, or school, of girls who d voted themselves to writing verse, she exercis much influence on the literature of her tim Indeed, the ancients admired her most extrav gantly. Aristotle placed her in the same ra with Homer, and Plato called her the "ten Muse," while Solon, on hearing one of h poems read, exclaimed that he would not wi ingly die until he had learned it by heart. H lyrics were passionate songs of love and natu and were arranged in nine books, one for ea of the nine Muses. Of her poems only t have come down to us entire—a beautiful *O to Venus* and an ode descriptive of the em tions of love. Various fragments remain, b their exquisite beauty cannot be shown in a translation.

Consult Wright's *Short History of Greek Lite ture.*

SAPSUCKER, *sap'suk er,* a group of bi of the woodpecker family, found only in Nor America. They are so called because they fe on the sap of trees, which they obtain by ma ing holes in the bark. The most common sp cies is the *yellow-bellied sapsucker,* the ma of which has a bright scarlet crown and thro and black coat with white markings. This sa sucker nests in the Northern United States a Canada, migrating southward in winter as f as Central America. It builds its nest in hol in trees, and the eggs, which are pure white, a five to seven in number. The *red-breasted* sa

sucker and *Williamson sapsucker* are species found west of the Rocky Mountains.

Sapsuckers have in general the habits of woodpeckers. See WOODPECKER.

YELLOW-BELLIED SAPSUCKER

SAPUL'PA, OKLA., the county seat of Creek County, is a rapidly-growing city in the rich oil district in the northeastern part of the state. The population of 8,283 in 1910 had increased to 12,929 (Federal estimate) in 1916. The area of the city is two and one-half square miles. It is fourteen miles southwest of Tulsa and 105 miles northeast of Oklahoma City, and is a division point of the Frisco Railway, which branches here in three directions.

Sapulpa, named for an old Indian resident, was settled about 1894 and became a city three years later. It contains the Euchee Indian Mission (supported by the government), a school occupying five splendid buildings on a campus of forty acres. The leading industrial establishments are railroad shops and yards, immense oil refinery, cotton gins, a cotton compress, machine shops, oil-well supply shops and manufactories of mattresses, confectionery, cigars, bricks and glass. Sapulpa adopted the commission form of government in 1911, and the city owns the water system. J.H.C.

SARACENS, *sair'a senz,* a name applied to various peoples by the European writers of the Middle Ages. The Mohammedans of Palestine and Syria, the Arab Moors who set up a kingdom in Spain in the eighth century, and the Seljuk Turks against whom the Crusaders fought were all known as Saracens. The name was originally applied by the Greeks and Romans to wandering Arab tribes of the Syro-Arabian desert, who were a disturbing element along the frontiers of the Roman Empire.

Related Subjects. In connection with this article on the Saracens, the reader may consult the following topics in these volumes:

Crusades	Saladin
Mohammedanism	Seljuks
Moors	Spain, subtitle *History*

SARAGOSSA, *sahr a gos'a,* a prosperous commercial city in the northeastern part of Spain, capital of the province of the same name. It is situated on the right bank of the Ebro River, 212 miles northeast of Madrid, and occupies the site of an ancient town of the Iberians. The name of the present city comes from *Caesarea Augusta,* which the Emperor Augustus applied to the settlement in 25 B.C., when he made it a Roman colony. In respect to appearance, Saragossa is said to be the oldest and the newest Spanish city, for around the central portion, with its crooked lanes and dilapidated houses, has been built a modern section with fine, broad avenues and handsome homes and buildings. There are several fine churches and schools, including a university founded in 1474.

The city is important as a railroad center and as a center of trade for a fertile farming region. Its industrial establishments include iron foundries, machine shops, flour and paper mills and manufactories of glass, chemicals, soap and candles. Saragossa was once the capital of the old kingdom of Aragon (see CASTILE AND ARAGON). During the war with Napoleon the city sustained a heroic siege (1808); one of its defenders, the "Maid of Saragossa," figures in Byron's poem, *Childe Harold.* Population in 1910, 111,704.

SARATOGA, *sair a toh'ga,* BATTLES OF, two engagements of the Revolutionary War, fought on September 19 and October 7, 1777, in the vicinity of Saratoga Lake, New York. The second was called by the historian Creasy one of the fifteen decisive battles of the world. These battles were important factors in a campaign planned by the British, the objects of which were the conquest of New York state, the crushing of Washington's army and the separation of New England from the rest of the colo-

nies. Three armies, under Burgoyne, Saint Leger and Lord Howe, were to meet in the neighborhood of Albany and make a concerted effort against the Americans. Burgoyne marched from Canada by way of Lake Champlain in May, and on the thirteenth of September crossed the Hudson River and took a position near Bemis Heights, where an American army under General Gates was stationed. On the nineteenth Burgoyne advanced with a force of 4,000 to attack the American left, but his army was intercepted at Freeman's Farm by 3,000 soldiers under Benedict Arnold, and an indecisive battle lasting two hours followed. Each side lost from 600 to 1,000 men. Because of the geography of the region, this engagement has been called the Battle of Freeman's Farm, the first Battle of Bemis Heights, the first Battle of Stillwater and the first Battle of Saratoga.

In the meantime Saint Leger had been so harassed by the Americans in the vicinity of Fort Stanwix that he had retreated to Lake Ontario, and Howe had been prevented by Washington from sending reënforcements to Burgoyne or coöperating with him. The latter, too, found that his supplies were cut off, and he therefore decided to risk another battle. On October 7 he led a force of 1,500 against the Americans, and was defeated in a battle in which Arnold took command of the colonial forces. The British retreated to Saratoga Heights, and there, on October 17, Burgoyne surrendered to General Gates the remnant of his army, about 6,000 men. B.M.W.

Consult Creasy's *Fifteen Decisive Battles of the World.*

Related Subjects. The reader is referred to the following articles in these volumes:

Arnold, Benedict
Burgoyne, John
Fifteen Decisive Battles
Revolutionary War in America

SARATOGA SPRINGS, N. Y., one of the most popular pleasure and health resorts in America, because of its curative waters, which attract many visitors and are shipped to all parts of the world. It is located in Saratoga County, in the east-central part of the state, thirty-eight miles north of Albany, the state capital, and twelve miles west of the Hudson River. Transportation is provided by the Boston & Maine and the Delaware & Hudson railroads and by electric interurban lines. In 1910 the population was 12,693; according to the state census it was 13,821 (Federal estimate) in 1916. The area of the city exceeds three square miles.

There are between forty and fifty nat springs distributed in three groups, one in city, one about a mile north and another same distance south. Because of borings w lessened the force of these springs, the st in 1909, made reservations of about 340 a in the territory where they occur. The w from all of the springs and wells is highly s rated with carbonic acid gas, and its medic qualities are due to this and other chem properties. It is especially recommended the treatment of rheumatism, indigestion heart and arterial disorders.

The city has a number of finely-equip hotels, in which more than 20,000 guests can accommodated. It has also a large Conv tion Hall seating 5,000, a town hall, a st armory, a school of arts, an Athenaeum several public libraries. In the city park, c ering ten acres, are the Casino and the Tr Memorial Fountain with its fine bronze figu *The Spirit of Life,* the work of Daniel Che French. There are several charitable insti tions and hospitals. Near the city is a fine r course, and about four miles southeast is be tiful Saratoga Lake, a favorite resort. T bottling and shipping of the mineral water the manufacture of medicines and drugs, gloves, furniture, paper-mill machinery foundry products are the leading industries.

The word *Saratoga* is derived from the dians and is said to mean *hillside country of great water.* The springs were known to Indians long before the coming of white n In the vicinity were fought several Indian b tles, and twelve miles distant is the battle f which witnessed the surrender of Burgoyne Gates, on October 17, 1777. A large distr which included the springs, was ceded to Dutch by the Indians in 1684. The first tlement was made in 1770, the first hotel b in 1774, and in 1826 Saratoga Springs was corporated as a city.

SARATOV, or **SARATOFF,** *sa rah' tohf,* capital of the Russian government (provin of the same name, and one of the most imp tant cities of Eastern Russia, is picturesqu situated on the heights which rise from right bank of the Volga River, 450 miles sou east of Moscow. It is a well-built city, w good streets, an imposing cathedral and sev fine public buildings. Agriculture, garden and manufacturing are the principal industr the industrial establishments include flour m oil works, railway shops and tobacco factor An Orthodox Greek bishop and a Roman Cat

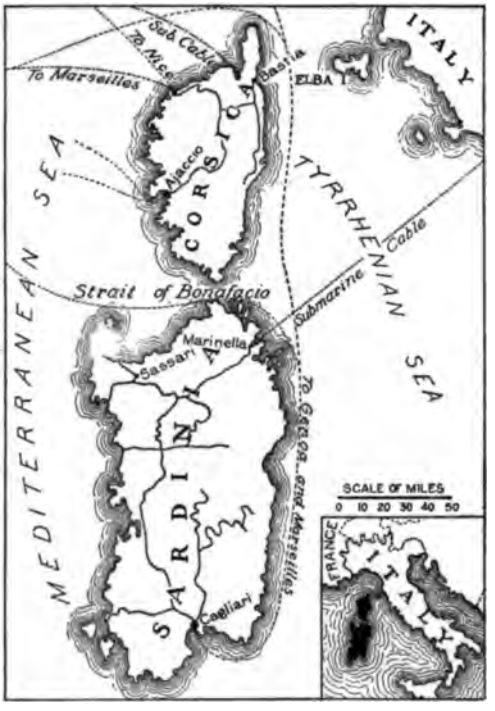
ıhop have their residence in Saratov. Popu-
ı, 1910, 217,400.

RCOPHAGUS, *sahr kahf'a gus,* a stone
which is usually placed in a vault or
instead of being buried. The marble
tacles containing the bodies of George
ington and his wife, which may be viewed
e family vault at Mount Vernon, are ex-
es of sarcophagi. The name, which is
a Greek word meaning *flesh-eating,* refers
. ancient belief that coffins made out of a
in stone found in Asia Minor would con-
the bodies placed within them. The sar-
ıgi of the ancient Egyptians, who regarded
caskets as the homes of their dead, are
ldest known. The bodies of the kings who
the Pyramids for their tombs were placed
ımmy cases, and these cases placed in great,
wed-out blocks of granite. The cover of
tone receptacle often had the form of a
ng roof, to carry out the idea of a house.
· the sarcophagus itself was fashioned to
ıble the swathed mummy. The Greeks
Etruscans followed the custom of elabo-
r decorating the sides of their stone coffins
figures in relief. See list of related sub-
following the article BURIAL.

RDANAPALUS, *sahr da na pa'lus.* See
RBANIPAL.

RDINE, *sahr deen',* a small, olive-green
rom two to four inches in length, which is
eat commercial value because of its fine
r. It is a member of the herring family.
nes are marketed in canned form, and are
ıp in oils, especially olive oil. The most
rtant fisheries are found along the coasts
e Mediterranean Sea and the coast of the
of Biscay, France. In the United States
g herring and menhadden are packed in
ınd marketed as sardines. A species re-
to the European fish—the *California* sar-
–is abundant on the American Pacific coast
s a valuable food fish, but it is not canned.
California sardine grows to be a foot long,
is dark bluish on the upper parts and
y below. The following operations take
in the preparation of canned sardines:
the entrails have been removed the fish
vashed, dried and placed in boiling oil.
are then drained and packed in tin boxes
ı are filled with pure olive or other oil.
the lids are soldered on the boxes are
d in boiling water or subjected to the
s of hot steam. *Sardines anchoisées,* or sar-
cured in red wine, are a delicacy known
e south of France (see HERRING).

SARDINIA, *sahr din'i a,* an island in the Mediterranean Sea, belonging to the kingdom of Italy. The island of Corsica, birthplace of Napoleon Bonaparte, lies directly to the north, the two islands being separated by the Strait of Bonifacio, nine miles wide; 115 miles northeast of the northeastern extremity of Sardinia lies the nearest point of the Italian peninsula.



SARDINIA AND VICINITY
The small corner map shows location of Sardinia and its sister island, Corsica, with respect to the mainland.

Only one of the Mediterranean islands—Sicily—is larger than Sardinia, the area of which, including the coast islets, is 9,306 square miles—almost exactly that of the state of New Hampshire. It is irregularly oblong in shape, and is 168 miles in length and about half as wide.

Commercially, Sardinia is important chiefly for its minerals and agricultural products. Mountains are found in nearly all parts, but those in the southwestern section have the richest mines. Lead, silver, zinc, antimony, lignite, granite and salt are the chief products of the mines, and the annual yield is valued at about $4,000,000. Wheat, oranges, olives, lemons and grapes are raised on the fertile plains between the mountains, and the raising of cattle is rapidly increasing in importance. About one-fifth of the land is forest-covered. The island has railroad

facilities and carries on a prosperous foreign trade, exporting minerals, wines, goatskins, olives, salt and fish, and importing coal, cotton and woolen goods and a variety of manufactured articles.

For administrative purposes Sardinia is divided into two provinces, Cagliari and Sassari. The capital of the island, Cagliari (which see), is a city of 60,000 inhabitants. Sardinia formed a part of the kingdom of Sardinia, the nucleus of the present Italian kingdom (see SARDINIA, KINGDOM OF). In 1913 it had a population of 863,215.

Consult Flitch's *Mediterranean Moods: Footnotes of Travel.*

SARDINIA, KINGDOM OF, a former Italian kingdom, which became the nucleus of the United Italy. It was made up of the islands of Sardinia and Caprera, the principality of Piedmont, the county of Nice, the duchies of Savoy, Aosta, Genoa and Montferrat and part of the old duchy of Milan. By a treaty made with Austria in 1720, the Duke of Savoy gave up Sicily, but gained in exchange Sardinia and acquired the right to constitute his dominions a kingdom. Sardinia, though it gave its name to the new realm, was by no means the important part, for the capital was Turin, in Piedmont, and there the affairs of the kingdom centered. The first king of Sardinia was Victor Amadeus I, who ten years after the formation of the kingdom abdicated in favor of his son, Charles Emmanuel I. During his reign some additions of territory were made.

Savoy was invaded by the French in the Revolutionary period, and that duchy, together with Nice, and, later, Piedmont, were surrendered to France. Indeed, when Victor Emmanuel I came to the throne in 1802, nothing but the island of Sardinia remained to him. The readjustment after Napoleon's downfall gave back the original territory, adding that of the Republic of Genoa, but Victor Emmanuel I was very unpopular because of his unliberal policies, and in 1821 he was forced to abdicate. Charles Albert, who came to the throne in 1831, granted liberal reforms to his people, and in 1848, the year of general revolution, put himself at the head of the forces which were trying to free Italy from the Austrians. In the next year he was defeated at Novara, and in consequence abdicated in favor of his son, Victor Emmanuel II. It was during the reign of this king that the struggle for freedom and a united Italy reached its climax, and he was made head of the new government.

Related Subjects. In connection wit article on the kingdom of Sardinia, the may consult the following topics in these vo

Genoa	Sardinia
Italy, subtitle *History of Italy*	Savoy, House of
Piedmont	Turin
	Victor Emmanuel I

SARDONYX, *sahr'doh niks,* a precious consisting of alternate layers of white a or reddish brown, the red layers being pa transparent. Sardonyx is a variety of on was formerly used for the stone in signet It is supposed that a sardonyx was one stones in the breastplate of the high pri the Israelites (*Exodus* XXVIII, 20), bu is a matter of uncertainty, because we d know whether the name was then given t same stone as now. Sardonyx is mention Saint John in his description of the Holy (*Revelation* XXI, 20), as the fifth of the fo tion stones. Some theologians consider donyx to be the emblem of spiritual stre It has been a popular birthstone in all the

Consult Kunz's *The Curious Lore of Pre Stones.*

Related Subjects. The reader is referr the following articles in these volumes:

Birthstones	High Priest
Gems	Onyx

SARDOU, *sahr doo',* VICTORIEN (1831-1 a French dramatist, born in Paris. He wa poor to complete the medical education h tempted to secure, and gained a livelihood cessively as tutor and as a writer of re and articles for popular encyclopedias. first dramatic attempts were far from suc ful; his troubles induced a severe attac typhoid fever, during which he was foun most in a dying condition in his lonely g with nothing at hand except rejected m scripts.

After his recovery his literary future be brighter, and he produced plays with asto ing rapidity—sometimes as many as four a These were chiefly comedies, characterize wit, clever satire, rapid movement and dialogue. Among his early successes were *dide* and *Fédora.* The character of Sar work did not increase the prestige of the s but his popularity secured for him electio the French Academy in 1878. His social sa include *Nos Intimes, Les Vieux Garçons, R bas, Le Roi Carotte* and *Divorçons;* his torical plays are *Patrie, La Sorcière, La H La Tosca, Madame Sans-Gêne, Thermidor Robespierre.*

.RGASSO, *sahr gas'o,* **SEA,** a tract of ng seaweed in the North Atlantic Ocean, ing an area greater than that of France. eneral boundaries are the 25th and 30th lels (north latitude) and the 38th and 60th lians (west longitude), but the position of seaweed mass varies as it is moved by s and currents. Columbus discovered the sso Sea on his first voyage to the New d, and his ships were entangled in it for weeks. Though the weeds are thickly mat- ogether in some sections, a vessel could become hopelessly involved in the tract se the patches are not continuous. It is ved by many authorities that the seaweed ALGAE) was originally carried by winds and nts from the Caribbean Sea and the Gulf exico.

.R'GENT, JOHN SINGER (1856-), a ost American portraitist and eminent er of landscape and figure pieces. He was at Florence, Italy, of American parents, n that city commenced his art studies. At age of eighteen Sargent began studying the French artist Carolus-Duran, of Paris, e influence was permanent and beneficial. xhibited in the Paris Salon regularly from to 1884, receiving in 1881 a second-class l for his *Portrait of a Young Lady.* This ing was the subject of an appreciation by ovelist Henry James. In 1884 Sargent set- permanently in London, where his reputa- as a portrait painter steadily advanced. ng the honors that came to him were the d Prize of the Paris expositions of 1889 1900, and the gold medal of the National tute of Arts and Letters (American) in

gent has painted portraits of some of the prominent men and women of his time, ding Carolus Duran, Claude Monet, Ed- Booth, Lawrence Barrett, Joseph Jefferson, Terry as Lady Macbeth (exhibited in go in 1893 at the World's Columbian Ex- ion), Theodore Roosevelt, John Hay and . Weir Mitchell. Among figure pieces are xquisite *Carnation Lily, Lily Rose,* repre- ng two girls lighting Japanese lanterns in wer garden; and *Carmencita,* a dancer in me. Among the glories of the Boston ic Library are his splendid mural decora- , including the celebrated frieze of the *He- Prophets.* Landscapes and figure pieces constituted the bulk of his work since 1909, his latest canvases include *The Weavers, Courtyard, The Fountain* (Art Institute, Chicago) and *Trout Stream in the Tyrol.* In 1917 he was commissioned by the governors of the National Gallery of Ireland to paint for the institution a portrait of President Wilson.

SARNIA, *sahr'ni a,* a city in Ontario, the county town of Lambton County. It is at the mouth of the Saint Clair River, directly opposite Port Huron, Mich., with which it has connection by a car ferry and by a railway tunnel under the river. The Grand Trunk and the Pere Marquette enter Sarnia. By rail it is sixty miles northeast of Detroit, 169 miles southwest of Toronto and fifty-nine miles west of London. Population in 1911, 9,947; in 1916, estimated, 10,500.

Sarnia has a large tonnage in lake traffic, being on the water highway between lakes Huron, Superior and Michigan on the west and lakes Erie and Ontario and the Saint Lawrence River on the east. It is also a large shipper of its own products, which include oil, lumber, salt, woodenware, stoves, thrashers and plumbers' supplies. The oil refinery, one of the largest in the Dominion, has about 1,400 regular employees. Of the city's buildings the courthouse and county buildings deserve special mention. Sarnia was incorporated as a city in 1904. Its name is the classical Latin for the island of Guernsey. T.D.

SARSAPARILLA, *sahr sa pa ril'a,* a drug somewhat widely used in "spring tonic" preparations. It is obtained from the dried roots of different species of smilax, found in Central and South America and Mexico. The roots are several feet long and about as large around as a goose quill. Modern physicians and chemists hold that the drug is inert, that is, has no curative properties, but its reputation gives it considerable commercial value. Lowell, Mass., is an important center for the manufacture of medical preparations of the drug. Sarsaparilla is used to some extent as a flavoring for ice cream soda.

SARTO, *sahr'toh,* ANDREA DEL (1487-1531), a great Italian master who holds a foremost place among the painters of Florence of the High Renaissance. He was one of the greatest colorists of his day; his style was dignified and his drawing masterly, and such was his knowledge of technique that he was known as the "Faultless Painter."

His real name was Andrea Vannucchi, but he was nicknamed Del Sarto, meaning "the tailor's son," because of his father's trade. He studied under several Florentine masters, and before he was thirty painted a series of seven

frescoes in the Santa Annunziata, the church of the Servites, at Florence. These paintings were followed by another notable series of frescoes, illustrating ten scenes from the life of John the Baptist. In 1519 he received a commission from Francis I of France to purchase works of art, but he squandered the money intrusted to him and was thenceforth forbidden to return to France. He spent the remainder of his life at Florence.

The most celebrated of his single pictures are the *Madonna del Sacco,* for the Servites; the *Last Supper,* in the refectory of th vent of San Salvi, near Florence; a *Madonna of the Harpies,* now in the Uffi lery. The frescoes in the Santa Annunzi his most celebrated. In addition, he p many other Madonnas, Holy Families an lar subjects for altarpieces. His oil paintin to be found in almost every gallery of E Andrea del Sarto was the subject of Brow famous poem, called by his name, whic sents him in a sympathetic, and his wife unfavorable, light.

SASKATCHEWAN, *sas katch' e wahn,* a province of the Dominion of Canada, formed in 1905 from the eastern half of the District of Athabaska and the greater part of the districts of Saskatchewan and Assiniboia. It lies between Manitoba on the east and Alberta on the west. The United States extends along its southern border, and the North West Territories bound it on the north. The entire boundary is marked by meridians and parallels of even degrees, the eastern boundary being longitude 102°, the western, longitude 110°; the southern boundary is parallel 49°, and the northern, parallel 60°.

Area and Population. Saskatchewan extends along the border of the United States for a distance of 393 miles; its northern boundary has a length of 277 miles, and its length from north to south is 760 miles. The area is 251,700 square miles, of which 8,318 square miles are water. The province is smaller than Alberta by 3,585 square miles. It is a little larger than Colorado and Montana combined, more than twice the size of Great Britain and Ireland and larger than the German Empire by 40,000 square miles.

The People. The rapid growth of Saskatchewan is revealed by its increase in population. In 1901 the old district of Saskatchewan had 91,279 inhabitants; in 1911 the province had 492,432 inhabitants, an increase of 439.48 per cent, and the official estimate of 1913 placed the population at 675,000. In 1911 there were 1.95 inhabitants to the square mile; in this number had increased to about 2.7. ever, the settled portion of the province i fined to the southern half, so the numb people to the square mile for the part province that is settled is greater tha above figures indicate. In 1911 131,365 p lived in cities and villages and 361,0 farms; that is, the rural population was two and one-half times the urban. The cities are Regina, Saskatoon, Moose Jaw Prince Albert. Each is described in its in these volumes.

About one-half of the inhabitants are B born, about one-fifth are immigrants fro United States, and the remainder are various European countries, among whom Ruthenians, Poles and Germans are the most numerous.

LOCATION MAP
Showing location of katchewan and the pr tionate part of the Dom it occupies.

Surface and Drainage. That part of the province lying between the Saskatchewan River and the United States boundary consists of open, rolling ric and gently-rolling plain. The region i ted here and there with clear lakes and cl of trees, and there are occasional stre

which are unbroken for long distances by slope or declivity, while, as far as the eye can reach, the view is not obstructed by a single tree. This region is broken in the east by a district north of the Qu'Appelle Valley, in which are located the Beaver Hills and Touchwood Hills.

North of Saskatoon and extending to the southern boundary of the great forest belt, which is approximately on a line drawn from the Swan River northwesterly to Prince Albert, is a large area of mixed prairie and woodland in which are located a number of government timber and game reserves. This is one of the most pleasing and fertile sections of the province. To the west of this region and south of the Saskatchewan River is a large, open area which is especially suited to ranching and growing wheat.

Much of the region between the Saskatchewan and Churchill rivers is a parklike country consisting of forests and open areas suitable for agricultural purposes. North of the Churchill the country is comparatively low and flat, with a light, sandy soil. Forests cover most of this region as far north as Lake Athabaska.

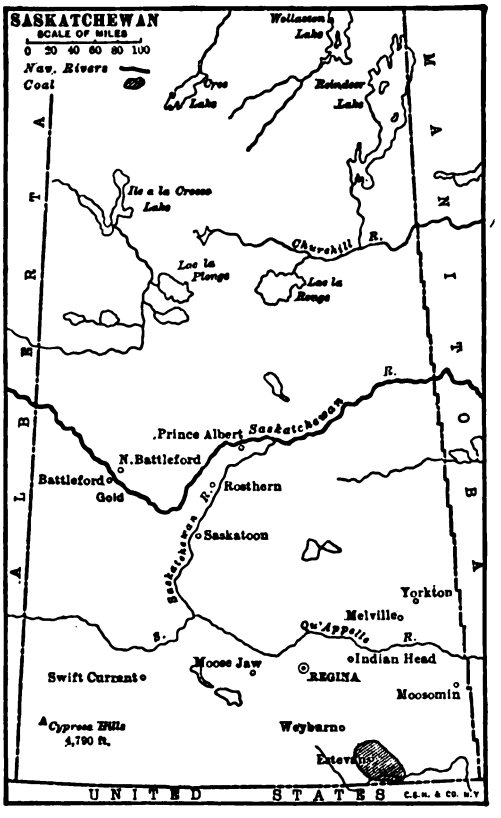
Rivers and Lakes. The southern part of the province is drained by the Saskatchewan, the Assiniboine, the Souris and their tributaries. The Churchill River flows across the central part and drains a chain of lakes of which Reindeer Lake is the largest. Each of these rivers is described under its title. The basin of the Churchill is separated from that of the Athabaska by a height of land that crosses the province in a northeasterly direction as far as Reindeer Lake, where it turns to the left and runs northward.

Big Quill Lake, east of Saskatoon, and Lake Johnson, in the south, are the only lakes of importance in the southern half of the province. In the valley of the Churchill and northward there are many lakes, the largest being Lake Athabaska, in the extreme northwest; Wollaston Lake and Reindeer Lake, in the northeast, and Lac la Ronge and Beaver Lake, near the central part of the province.

Climate. The winters are long and cold, but the atmosphere is dry and bracing, so a much lower temperature is endurable here than in a humid atmosphere. The southeastern corner of the province forms a remarkable exception to winter conditions elsewhere because of the influence of the Chinook winds which make the winters in that section very mild. See CHINOOK.

Plants and Animals. The open country in the park and prairie regions is covered with native grasses and wild flowers. The grasses make excellent hay. Between the Saskatchewan and the Churchill rivers are large forest areas. The poplar and the birch predominate on the highland, and fir, spruce and hemlock on the lower levels. North of the Churchill the forest consists almost wholly of cone-bearing trees.

Animals. In the forests are found the animals common to this northern latitude, the



OUTLINE MAP OF SASKATCHEWAN

On this map are shown the provincial boundaries, the chief cities, lakes and navigable rivers, coal deposits and the highest point of land in the province.

bear, the wolf, the mink, the otter, the fox, the skunk and the muskrat, all valuable for their fur. Since there is danger of some of these animals being exterminated by overhunting, the Saskatchewan government has enacted stringent game laws. Elk, moose and deer roam the forests in the north, and the pronged antelope is found in the rolling country in the southwest. In summer the lakes are frequented by thousands of waterfowl that

seek these secluded regions for nesting. The rivers and lakes abound in fish, and with the development of the country the fishing industry will become important. In 1915 the catch was valued at $165,888. Whitefish, pike, pickerel and trout, in the order named, yield the largest returns.

Minerals and Mining. There are large deposits of lignite near Estevan and along the Souris River in the southeastern part of the province, where several companies are carrying on mining operations. The Canadian Pacific Railway is operating coal mines near Wood Mountain, and deposits of coal have been discovered west of Saskatoon. Gold, silver and petroleum are known to exist in the province. Clay of good quality occurs around Estevan and in several other localities, and natural gas has been found at Swift Current. The value of the total mineral output for 1914 was $710,840.

Agriculture. Saskatchewan is the leading province of the Dominion in the production of wheat and the second in the production of live stock. Both spring and winter wheat may be grown, but the spring varieties constitute by far the greater part of the crop. Both soil and climate are especially adapted to the production of this grain of the highest grade, and Saskatchewan wheat has won the first prize in a number of agricultural exhibitions in Canada and the United States. Other important grains are oats, barley and rye. Flax is also raised to a considerable extent. The leading grain crops for 1915, which was considered a representative year, were as follows, the figures representing bushels:

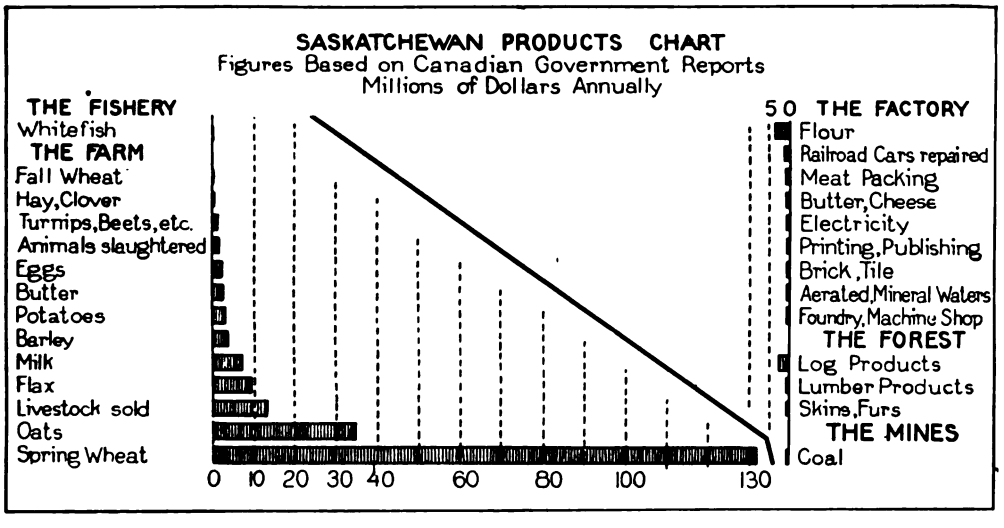
Wheat	195,168,000
Oats	157,628,000
Barley	10,570,000
Flaxseed	9,061,000

The crop in 1916 fell from five per cent to twenty per cent below the above figures. Potatoes and root crops are successful throughout the province, and small fruits are grown. Hay, alfalfa and other forage crops are abundant and contribute largely to the success of the live-stock industry.

The southwestern section lies within the area affected by the Chinook winds, and is especially suited to raising horses and cattle, since stock can be pastured throughout the year. The park region between the Saskatchewan and Churchill rivers is destined to become a great

dairy region. Pure water, a cool climate and excellent pasturage all tend to the production of butter of the best quality. The estimated output of butter for the province in 1916 was 4,500,000 pounds, and the industry is rapidly growing. More than one-half the coöperative creameries are operated by the dairy branch of the Department of Agriculture, which also undertakes to market all the export butter of the province. Horses, beef cattle, sheep and swine are raised in large numbers, and the poultry industry is not inconsiderable.

The College of Agriculture at Saskatoon, besides maintaining an experimental farm, does extension work throughout the province, and



offers scholarships to young people in the rural districts where there are government field agents. A "better-farming" train traverses the province yearly, and a special dairy car visits the dairy districts. Further instruction is given by lectures, bulletins and other pamphlets. Home-makers' clubs, with branches in all rural sections, contribute to the enrichment of rural life, and local agricultural societies, many of which receive government aid, all combine to make rural life pleasant, progressive and in every way worth while.

Manufactures. The value of the manufactured products increased from $651,667 in 1900 to $6,332,132 in 1910, a gain of 872 per cent, but manufacturing is still comparatively undeveloped. The leading products are lumber, bricks and flour.

Transportation and Communication. Three great railway systems—the Canadian Pacific, the Canadian Northern and the Grand Trunk Pacific—traverse the province from east to west. Besides its main line, each system has numerous branch lines; the settled portion of the province is thus well supplied with railways. Regina and Moose Jaw in the south; Saskatoon in the central, and Battleford in the northern part of the settled portion are the most important railway centers. In 1916 the railway mileage was about 6,000 miles. Direct connections are maintained with British Columbia and the provinces east and with the United States. Saskatchewan has over 14,000 miles of telephone wire under government control, extending practically to every hamlet as well as to many farms.

Education. The school district is the unit for local education, and free public schools, upon which attendance is compulsory, are maintained throughout the province. The school system is in charge of the minister of education, who is a member of the executive council. The University of Saskatchewan at Saskatoon is at the head of the system, and provincial normal schools are maintained at Regina and Saskatoon. There are also a number of educational institutions of high order under control of the various religious denominations. Among these are the Saskatchewan Boys' College at Moose Jaw; the Presbyterian Theological College, affiliated with the University of Saskatchewan; Regina College (Methodist); University of Emmanuel College and Saint Chad's College (Anglican).

The public schools are supported by a provincial fund and by local taxes. The affairs of each district are managed by a local board.

The teaching of a foreign language one hour a day is allowed in districts having foreign population.

Government. The lieutenant-governor, appointed by the Governor-General of Canada, is the chief executive officer of the province. He is assisted by an executive council of seven members, each of whom is the head of a department of the provincial government. The premier is the head of the council. The legislative department consists of an assembly of fifty-four members. Saskatchewan sends sixteen members to the House of Commons at Ottawa, and is represented by four members in the Dominion Senate. The judicial system comprises the supreme court and district courts.

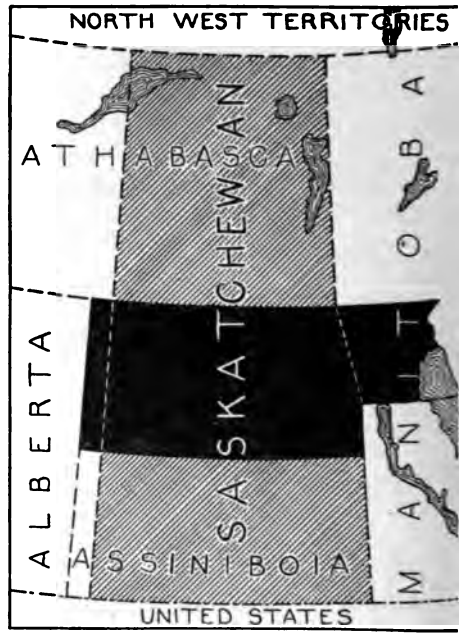
A unique feature of local government is found in the Saskatchewan local government board, consisting of three members. The board deals with separate school board appeals and assessment appeals, but its most important duty consists in passing upon all proposed municipal loans before they can be authorized.

History. Saskatchewan was a part of the vast territory which, under the name of Rupert's Land, was controlled by the Hudson's Bay Company. Long before there was any attempt to found settlements in the country north and west of the Great Lakes, this company had established trading stations around Hudson Bay and far inland to the south and west. In 1817, a permanent settlement was founded in the valley of the Red River under the direction of the Earl of Selkirk, who had obtained a controlling interest in the Hudson's Bay Company. This settlement, which was in the present province of Manitoba, constituted the beginning of the political organization of the great Canadian Northwest. Soon after the organization of the Dominion of Canada, in 1867, measures were taken to secure control of the Hudson's Bay Company's rights, and these rights were purchased in 1869 for $1,500,000.

The entire region north and west of the provinces of Ontario and Quebec became known as the North West Territories and was divided for the purpose of administration into a number of districts. In 1870 the province of Manitoba was organized. With the completion of the Canadian Pacific Railway in 1885 immigration began to flow into the vast fertile region north of the United States. With the increase of population came an increasing demand for responsible local government, and in 1905 the provinces of Alberta and Saskatchewan were organized from the districts of Alberta, A baska, Saskatchewan and Assiniboia; katchewan being formed of Assiniboia, katchewan and the eastern part of Athab

A local rebellion occurred after the ope of the country to settlement, headed by L Riel. It is described under the title KATCHEWAN REBELLION.

The province was organized in 1905 Hon. Amédée Forget as the first lieuten



FORMATION OF THE PROVINCE

The area in solid black was Saskatchewan fore the organization of the present province. dotted lines through the black area show the p of the old province which were given to Alb and Manitoba. To the north and south the sh areas are the parts of former Athabasca Assiniboia which were included in the province.

governor. Hon. Walter Scott was chosen mier, and he continued at the head of the ernment for more than ten years. The org zation of the province was followed by a r increase of settlers, and the first decade of katchewan's existence as a province was c acterized by unusual growth in wealth population.

The assembly has shown foresight and li ality in the enactment of laws for promo agricultural, industrial and educational inter In 1915 a prohibition law, valid during the of the Nations, was passed. The province made large contributions of men, money supplies towards supporting the allies in war.

RESEARCH QUESTIONS ON SASKATCHEWAN

(An Outline suitable for Saskatchewan will be found with the article "Province.")

How can you tell whether the Saskatchewan River was named for the province or the province for the river?

In what very important agricultural product does Saskatchewan rank first among the provinces of Canada?

What proves the unusual excellence of this product?

What is there curious and interesting about the boundary lines of this province?

How can it be, since the eastern and western boundaries are meridians, that the northern boundary is so much shorter than the southern?

How does the greatest altitude of this province compare with those of the provinces which bound it to the east and west? With those of the states of the American Union upon which it borders?

What state of the United States does this province most closely resemble in area? (See list in article UNITED STATES.) What country of Europe? (See table facing page 2092.)

How do these political units which it resembles in size compare with it in population?

What stand did Saskatchewan take on the liquor question during the War of the Nations?

Why are the winters in the southeastern section warmer than winters elsewhere in the same latitude?

How does the province compare in density of population with the Dominion as a whole? With the provinces to either side of it?

Is Saskatchewan largely a "city" province or a "country" province—that is, do the majority of the people live in towns or under rural conditions?

In what way does the southern part of the province resemble in its surface features Illinois or Iowa?

What large lake lies partly in Saskatchewan and partly in Alberta? How large is it? How many lakes in Canada have a greater area?

What are the most favorable features of the climate? What is the most unfavorable, from the point of view of the farmer?

Why have strict game preservation laws been necessary?

What animal which used to be plentiful in the southern part of the province is no longer to be seen?

What advantages has the southwestern section which fit it especially for the raising of cattle and the making of butter?

How does the government help the farmers to dispose of their butter?

What "extension" work does the College of Agriculture do to help the farmers in their homes?

Who was Louis Riel? What part did he play in the history of the province and in that of Canada as a whole?

What is the railroad mileage of the province to each hundred square miles of area? How does it compare in this respect with the provinces and states upon which it borders? With Canada as a whole?

Why was this region first entered by the white men? When was the first permanent settlement made in this western region? Was that settlement within the present limits of Saskatchewan?

Other Items of Interest. The name Saskatchewan is a Cree Indian word meaning "rapid river." It thus belonged to the river before it did to the district or province.

The highest altitude in the province is reached in the Cypress Hills, where a peak rises to a height of 4,790 feet.

One of the terrors of the Saskatchewan farmer is the occasional hailstorm which leaves his growing crops beaten into the ground. To meet this possible loss, which amounts in some seasons to $2,000,000, a hail tax is levied and the farmers are insured against hail.

There are in the province over 11,000 Indians, mostly Crees. All the Indians live on government reservations, and these reservations are for the most part self-supporting. Many of the Indians are excellent farmers, trained for their work in the industrial schools of the province.

Saskatchewan has about 8,700 Dukhobars, members of a curious religious sect from Russia whose doctrines somewhat resemble those of the Quakers.

The valley of the Saskatchewan was one of the chief centers of the activities of the fur traders, and over the open plains south of the river great herds of buffalo roamed. E.H.O.

Consult Boam and Brown's *The Prairie Provinces of Canada;* Black's *History of Saskatchewan.*

Related Subjects. The reader who is interested in Saskatchewan will find material of value in the following articles in these volumes:

CITIES AND TOWNS

Arcola	Moosomin
Assiniboia	North Battleford
Battleford	Prince Albert
Canora	Regina
Estevan	Rosthern
Humboldt	Saskatoon
Indian Head	Shaunavon
Maple Creek	Swift Current
Melfort	Weyburn
Melville	Wolseley
Moose Jaw	Yorkton

HISTORY

Hudson's Bay Company	Riel, Louis
Red River Rebellion	Saskatchewan Rebellion

PRODUCTS AND INDUSTRIES

Butter	Oats
Dairying	Wheat
Lumber	

WATERS

Assiniboine River	Churchill River
Athabaska, subhead *Athabaska Lake*	Saskatchewan River

SASKATCHEWAN, UNIVERSITY OF, an institution founded in 1907 at Saskatoon, by act of the provincial legislature. The university campus, containing 1,333 acres, lies along the Saskatchewan River. The institution is organized into colleges of arts, science and agriculture. Special emphasis is placed on the work in the college of agriculture, especially the short courses, and this department coöperates closely with the Saskatchewan department of agriculture in the direction of institute meetings and home-making clubs. In 1912, when the university held its first commencement, there was a student enrolment of 160. There are now about 450 students and forty instructors, and the library contains 20,000 volumes.

SASKATCHEWAN REBELLION, *sas katch' e wahn re bel' yun,* a rising of the half-breeds in Canada in 1885 under the leadership of Louis Riel. Shortly after the collapse of the Red River Rebellion (which see) the Canadian government granted to each of the métis or half-breeds 240 acres of land. For a time this generosity seemed to have solved a difficult problem, but as Manitoba began to fill with settlers many moved westward and settled on the banks of the Saskatchewan River. There they were again disturbed by the advance of the settlements, and particularly by the construction of the Canadian Pacific Railway. The Indians and half-breeds resented, first, the threatened extinction of the buffalo herds, on which they depended for food. They also feared that their lands, to which they had no patents or titles, would be taken from them, and they were dissatisfied with the government's method of surveying, which eliminated the old French system of having all farms front on the river.

RIEL REBELLION MEDAL

North West Canada medal granted to all who served in the rebellion. The word Saskatchewan appeared only on the medals of those who were present at the actions of Fish Creek, Batoche and Frenchman's Butte. The reverse side contains the head of Queen Victoria and the words, *Victoria regina et imperatrix.*

With these difficulties ahead of them, the métis, in 1884, called on Louis Riel, who was then in Montana, to help them maintain their rights. In the following March Riel was elected president of the provisional government which the métis established at Saint Laurent. At first Riel was moderate, and there was hope that the government would eventually make the wanted concessions. Before the government could make up its mind, an unfortunate encounter took place at Duck Lake between some of the Mounted Police and a band of métis. This skirmish was followed by a rising of the Cree Indians, who, led by Big Bear, attacked a little settlement at Frog Lake. The men were killed, and the women and children carried away. The news of the outbreak caused great excitement in Eastern Canada. A force of 4,400 men was hastily collected, and in two months time were in the field and ready for combat.

The commander of the government's forces was General Middleton, who divided his army into three units or columns. The first, under General Middleton, was to advance from Qu'Appelle to Batoche; the second, under Colonel William D. Otter, was to advance from Swift Current to Battleford; and the third, under General Strange, was to march from Calgary to Edmonton. All three columns were to use the Canadian Pacific Railway as the base of operations. All three of the columns were successful. General Middleton's column defeated Riel's force at Fish Creek, near Batoche, and three days later took Riel prisoner. Big Bear's forces were broken by a special flying column under Major S. B. Steele, and Poundmaker, the other Cree chief, surrendered at Battleford. Riel was tried at Regina, and was hanged for treason. A number of the other leaders were executed, and a few, including Poundmaker, were imprisoned.

Results of the Rebellion. Although insignificant from a military point of view, the rebellion had important results. It led the Dominion government to recognize the claims of the métis, and to give them deeds to their lands. The North West Territories, in view of their increasing importance, were given representation in Parliament. But the most important effect was that it brought home to all Canadians the reality of Confederation and stimulated national feeling. W.F.Z.

SASKATCHEWAN, *sas katch'e wan,* **RIVER,** a Canadian stream which forms, together with the Nelson River, the greatest river system flowing into Hudson Bay. The Saskatchewan-Nelson is one of the four great river systems east of the continental divide of North America; the other three are the Mississippi, the Saint Lawrence and the Mackenzie. The Saskatchewan has a length of 1,205 miles from its mouth to the source of its chief tributary, the Bow. The area which this system drains includes 158,800 square miles, an area more than one and one-half times as large as that of the Great Lakes and seven times as large as that of Nova Scotia. The combined Saskatchewan-Nelson has a drainage basin of 370,800 square miles, or one-tenth of the total area of the Dominion of Canada. See map, facing page 1096.

The Saskatchewan is formed by the junction of two branches, the North and South Saskatchewan, which unite about twenty-five miles east of Prince Albert, in the province of Saskatchewan. The Saskatchewan proper is 240 miles long, and flows east to the northwest corner of Lake Winnipeg. Shortly before entering Lake Winnipeg, the river flows through several lakes, the largest of which is Cedar Lake, thirty miles long. Below Cedar Lake navigation is interrupted by rapids, but west of the lake the river is navigable for large steamers as far as the junction of the north and south branches. Smaller, shallow-draught vessels ascend the North Saskatchewan as far as Edmonton, nearly 500 miles farther. The river is narrow and rapid throughout most of its course. "Saskatchewan," in fact, is a Cree Indian word meaning "rapid-flowing river."

The North Saskatchewan has its rise in the glaciers on Mount Hooker, in the Rocky Mountains of Alberta. Flowing eastward across Alberta, it skirts the southern border of the northern coniferous forests, and meets the south branch slightly more than halfway across Saskatchewan. The North Saskatchewan is about 760 miles long, and drains an area of 54,700 square miles.

The South Saskatchewan, which is usually regarded as the main stream, has several head streams, of which the Bow is perhaps the most important. The Bow rises in the foothills of the Rockies west of Calgary, and after an east-southeast course of 315 miles unites with the Belly River, which comes from the southwest corner of Alberta, to form the South Saskatchewan. Some of the head streams of the South Saskatchewan rise in Northern Montana. The South Saskatchewan is 865 miles long to the head of the Bow, and has a drainage basin of

65,500 square miles. The waters of this stream are less important for navigation than those of the north branch, but are of untold value for irrigation (see the article ALBERTA, subhead *Irrigation*). W.F.Z.

SASKATOON', a city in Saskatchewan, in the central part of the province. It is situated on the South Saskatchewan River, on the main line of the Grand Trunk Pacific, and on branches of the Canadian Pacific and Canadian Northern railways. It is 311 miles by the shortest route southeast of Edmonton, 160 miles northwest of Regina, 400 miles northeast of Calgary and 467 miles northwest of Winnipeg. The city takes its name from a small shrub and its berry, called *saskatoon* by the Blackfoot Indians and also known as service berry or June berry. Saskatoon was founded in 1890, but as late as 1901 was merely a village of a hundred people. It was incorporated as a city in 1906, and adopted commission government in 1910. Population, 1911 Dominion census, 12,004; 1911 civic census, 18,096; in 1916, estimated, 25,000.

Saskatoon is one of the most important cities in the Canadian West. It is at once a railway center and a commercial and manufacturing center of the first rank. It has over 200 wholesale houses and numerous retail establishments. It is a large shipper of wheat, and has one of the great interior elevators (capacity 3,500,000 bushels) erected by the Dominion government. One of its largest manufacturing establishments is the mill of the Quaker Oats Company; this has a daily capacity of 1,200 barrels of flour and 350 barrels of oats. Ironworking and the manufacture of bedding and garments are other important industries. The city owns and operates all its public utilities, including waterworks, electric light and power system, and electric street railway.

Saskatoon is the seat of the University of Saskatchewan (which see), and also has a provincial normal school (established in 1912), a collegiate institute, Presbyterian College (established in 1912 and opened in 1914) and Emmanuel College, an Anglican theological school. Emmanuel College was founded at Prince Albert in 1879, but was removed to Saskatoon in 1909. In addition to the splendid buildings of these institutions special mention must also be made of the post office, erected in 1908 at a cost of $50,000, the many large public schools, four of which cost $150,000 each, and the Canada building, completed in 1913 at a cost of $600,000. Saskatoon is the seat of a judicial district, and has a Dominion land fice and land-titles office. A.MCG.

SASSAFRAS, *sas'a fras*, a tree of the la family whose aromatic bark yields an oil u in flavoring medicine. Drug stores someti sell the bark itself to people who wish to m the spring tonic known as "sassafras tea." sticky substance, obtained from the leaves twigs, is used in the Southern United State flavor gumbo soups. The tree is found fr Southern Vermont to Florida and Texas, a west as far as Kansas. It is usually from thi

SASSAFRAS LEAVES
Showing variations in form.

to fifty feet high, though along roadsides often grows merely as a shrub. In autu the tree is strikingly beautiful, because of rich gold and scarlet foliage. The leaves of three different shapes, ovate, two-lobed three-lobed, and all three kinds are found one twig. The flowers are yellow and the fr a dark blue berry. Sassafras wood is str and light and is used in making posts and r

SATELLITE, *sat'e lite*, a word deri from the Latin *satelles*, meaning *an attend* In astronomy the term is used to describ celestial body revolving around a planet. T moon is a satellite of the earth; it revol round the earth and attends or follows earth in its journey round the sun. Satu Jupiter, Mars, Uranus and other planets have satellites which revolve round them the moon revolves round the earth. In case of the moon it is considered that satellite was formerly a part of the earth, ing thrown off into space and held there the attraction of the sun and the earth; same theory (nebular hypothesis) accounts the formation of the other satellites.

Related Subjects. For further information on the general subject see the following articles in these volumes:

Astronomy	Nebular Hypothesis
Eclipse	Planet
Jupiter	Saturn
Moon	Star

SAT'IN, a glossy, silken fabric, which is woven in such a way that the threads of the weft are almost all hidden by the warp, thus presenting a more unbroken surface. Satin has a peculiar gleam which no other fabric possesses; its smooth surface reflects rays of light almost like a mirror. Satin is made plain, damasked, open-worked, striped or embroidered. As a material for women's dresses satin is not used as much as formerly, its place being taken to a large extent by lighter materials. The chief centers of satin manufacture are Lyons, Genoa and Florence, although large quantities are now made in Great Britain and the United States. The term satin is properly applied only to silk goods; woolen, linen and cotton imitations are usually known as *sateens.*

SAT'IRE, the name given by the Romans to a type of poem in which men and manners were held up to ridicule, often of the most scathing sort. With some poets the object of the ridicule was to better the conditions which they satirized; with others mere bitterness underlay the writing. Lucilius was the originator of the form, and Juvenal its most famous master. His biting comments on the vicious life of Rome have been imitated by a number of later poets. Dryden's *Absalom and Achitophel* and *MacFlecknoe,* Johnson's *London* and Pope's *Dunciad* are among the great satirical poems in English, while Swift's *Gulliver's Travels,* in prose, is one of the greatest satires in any language. In the United States, Lowell, Holmes and Mark Twain made much use of satire in their writings, but with them it had not the fierceness which often distinguished it in classic times. Haliburton is the foremost Canadian satirist.

SATOLLI, *sah toh'lē,* FRANCESCO (1839-1910), a Roman Catholic prelate, born at Perugia, Italy, and educated in that city. For a time he taught theology at Urban College of the Propaganda, and in 1889 was created archbishop of Lepanto. In that same year he was sent to the United States as papal representative at the centenary celebration of the establishment of the Roman Catholic hierarchy in the United States, and in 1893 returned to the same country as first apostolic delegate. Created cardinal in 1896, he returned to Rome in the same year. When Pope Leo died in 1903, many believed that Cardinal Satolli would be elected to succeed him, but the choice of the sacred college fell upon Giuseppe Sarto (Pius X).

SATURDAY, *sat'ur da,* the seventh day of the week, the day of the Roman god Saturn. This is the only day named for a Roman deity; all the others have Anglo-Saxon names. Saturday is the Sabbath day among the orthodox Jews. Many states have made Saturday afternoon a legal holiday, and it is a growing custom for employers in other states to give their workmen a half holiday. A further advance is the step taken in 1914 by a number of prominent department stores in New York City, whereby the stores remain closed all day Saturday, as well as Sunday, and the employees are given two holidays each week.

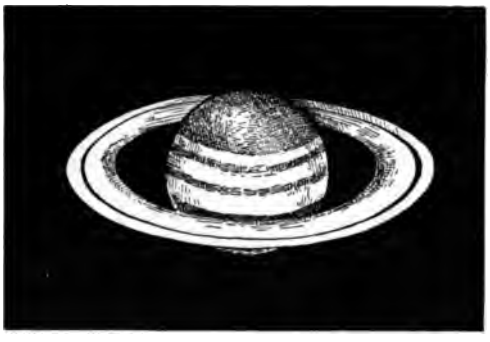
SAT'URN, the sixth planet in distance from the sun, and next to Jupiter in size. It was known to the ancients and marked their boundary of the solar system, beyond which they knew of no stars or planets. Little is definitely known about Saturn. Its average distance from the sun is 886,000,000 miles, but that distance varies 100,000,000 miles over and above the average, on account of the variation in the planet's orbit. Saturn rotates on its axis in 10 hours, 14 minutes, and revolves round the sun in twenty-nine and one-half years. Its surface is about ninety times that of the earth, its volume 770 times, its mass ninety-five times; but its density is only one-eighth the earth's density, or less than that of water.

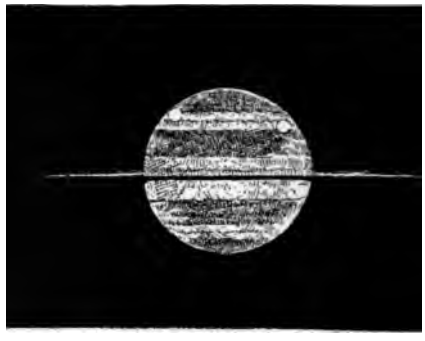
Saturn appears as a big, yellow star, outshining all others with the exception of Sirius. The planet has ten satellites and is surrounded by a system of rings such as do not exist anywhere else in the solar system. It is best observed in late summer or early autumn, in the eastern or southeastern sky, moving southward as the evening advances.

Saturn's Rings. The ring system of Saturn has been the object of much speculation and study, but the use of modern instruments has enabled astronomers to determine what the rings really are. In 1610 Galileo, working with a telescope that would be despised in any modern observatory, was puzzled to notice a peculiarity on the surface of Saturn for which he could not account. In 1665 Huyghens explained the mystery of Saturn's ring, believing only one to be present. Now, however, it is known that the planet is surrounded by three concentric rings. These rings are composed of myriads of separate meteoric particles, each

particle moving in its own orbit round the planet, the whole producing the effect of a gauzelike ring, resembling particles of dust in a ray of sunlight. The outer and larger ring has a diameter of 173,000 miles and a thickness of probably 100 miles.

Saturn's Satellites. The system of which Saturn is the center is enormous. The largest of the ten satellites, Titan, was discovered by Huyghens in 1665. It is not visible to the naked eye, but can easily be found with the aid of a small telescope. Its distance from Saturn is 770,000 miles, and it has a diameter of 3,000 or 4,000 miles, its mass being about double that of our moon. Another of the satellites, Iapetus, is 2,225,000 miles from the planet and revolves round it in seventy-nine days. The tenth and smallest of the satellites was discovered in 1905. F.ST.A.





THE PLANET SATURN

At left, as seen through a small telescope. At right, the rings, seen edgewise, appear as a luminous line crossing the globe of the planet.

Related Subjects. For illustration of comparative sizes of Saturn and the other planets and their distances from the sun, see PLANET. Other articles to which reference is suggested are the following:

Astronomy	Solar System
Nebular Hypothesis	Star

SAT'URN, in classical mythology, the youngest of the Titans and son of Uranus and Gaea. He overthrew his father and became ruler of the universe and was happy until the birth of his first child. Then he remembered that an oracle had declared that he should be dethroned by his child, and to prevent this he swallowed the babe. Four other children met a like fate, but when Jupiter, the sixth and last, was born, the mother concealed the babe and gave Saturn in its stead a stone, wrapped in child's clothing, which he swallowed without noticing the substitution. When Jupiter grew up he dethroned his father and banished him to Italy, where he set up a most prosperous kingdom. He taught the people agricultu useful arts, and his reign in Italy was kn the Golden Age. Saturn is shown in art old man bent with infirmities. In his h holds a scythe and a serpent which bi own tail—emblems of time and of the Saturn himself is the personification of and the story of his swallowing his chil but an allegorical way of saying that creates only to destroy.

SATURNALIA, *sat ur na' li a,* an ancie man festival in honor of Saturn, the go presided over the sowing of the seed. festival began on December 17 and lasted the Caesars for seven days. The first da devoted to public religious rites, and sa were offered to Saturn; the usual family fice was a young pig. The festival was e one of mirth, the schools observed hol the courts of law were closed, and banque family gatherings were held. The Satur festivals were participated in by the slave were considered free for the time, and wait by their masters. The last days of the fe were devoted to visiting and giving pre Little clay images were the principal They were called *sigillaria,* and from th tom of giving these, the last days of the fe were called the *sigillaria.*

SATYR, *sat' er,* or *sa' ter,* in Greek thology, a god of the woods, who had a head and hairy body, but the ears, legs an of a goat. Satyrs are associated with the ship of Bacchus, and appear in the chor the dramas acted at the Bacchic festivals. was the chief of the satyrs.

Related Subjects. The reader is refer the following articles in these volumes:

Fauns	Pan
Mythology	Silenus

SAUGUS, *saw'gus,* MASS., a town in Essex County, eight miles north of Boston and four miles west of Lynn, of which it was a part until its separate incorporation in 1815. It is on the Saugus River, an extension of Lynn Harbor, and is served by the Boston & Maine Railroad and electric interurban lines. The town has a public library. Its chief industrial establishments are woolen mills and manufactories of spices, brick, leather, rubber goods and iron-foundry products. The area of Saugus is about eleven square miles, and within the corporate limits are the villages of East Saugus and Cliftondale. In 1910 the population was 8,047; it was 10,226 by the state census of 1915.

SAUL, *sawl,* the first king of Israel, who ruled in the eleventh century B. C. He followed Samuel, the last of the judges. Having gathered together the armies of Israel, Saul, aided by his son Jonathan, waged successful war against encroaching tribes, especially the Philistines. The story of Saul, as told in *I Samuel,* is one of the most tragic of Bible history. At first appearing as a man of heroic stature and modest manner, he soon began to show an erratic temper and uncontrolled self-will. This developed into a kind of jealous madness, dangerous alike to enemies and friends. The youthful David, who was engaged to play day by day upon the harp to quiet his ravings, became the object of his bitterest persecutions. So darkened did his mind finally become, that, on the last night of his life, he went disguised to the Witch of Endor to ask the outcome of the next day's battle. It proved to be death to Saul and his sons, and the hunted David returned to reassemble the scattered armies, avenge the king's death and succeed him.

David's noble lament for Saul, his king, and Jonathan, his friend, contains the words:

Saul and Jonathan were lovely and pleasant in their lives,
And in their death they were not divided;
They were swifter than eagles,
They were stronger than lions.
. . . . . .
How are the mighty fallen in the midst of the battles!

SAULT SAINTE MARIE, *soo saint ma'ri,* a city in Ontario, on the Saint Mary's River, directly opposite the city of the same name in Michigan. The Canadian city is on the Canadian Pacific and the Algoma Central & Hudson Bay railways. The latter runs from the Sault to the National Transcontinental Railway, and also connects with the Canadian Northern, the Duluth, South Shore & Atlantic, and the Minneapolis, Saint Paul & Sault Sainte Marie (Soo Line) railways. By rail Sault Sainte Marie is 618 miles west of Montreal, and by water it is about 870 miles from Montreal, 237 miles from Fort William and Port Arthur, and 342 miles from Duluth. Population in 1911, 10,984; in 1916, estimated, 14,500.

Sault Sainte Marie is the capital of the Algoma district of Ontario. It has a large water commerce, chiefly in grain and iron ore passing to the East and coal passing to the West. Navigation around the "Sault," or rapids, is facilitated by the various Sault Sainte Marie Canals (which see). The city is one of Ontario's manufacturing centers, the capital invested in manufacturing being about $70,000,000. Steel, rails, coke, pulp and paper, tar, chemicals and lumber in all forms are the leading products. The output of a single large pulp and paper mill is valued at $5,000,000 a year, and the employees number about 2,000. About 6,000 men are in mills of the Algoma Steel Corporation. Nearly a million tons each of ore and coal are handled on the docks of this city.

The city owns (since 1914) its water and lighting systems. There are numerous imposing public buildings, among them the post office and customhouse, built in 1905, the Algoma Central Railway station, the Y. M. C. A. building and Kings Theater. There is also a general public hospital. Sault Sainte Marie was settled about 1850, and was incorporated as a city in 1912. C.W.MC C.

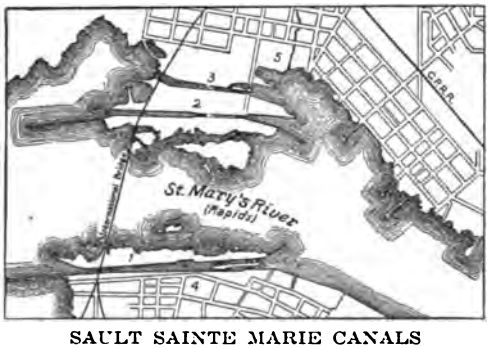
SAULT SAINTE MARIE, MICH. (pronounced *soo saint ma'ri* and popularly called "The Soo"), the county seat of Chippewa County, is situated along Saint Mary's River, in the northeastern corner of the Upper Peninsula, 150 miles east of Marquette and opposite an Ontario city of the same name. It is served by the Canadian Pacific, the Duluth, South Shore & Atlantic and the Minneapolis, Saint Paul & Sault Sainte Marie railroads. In 1910 the population was 12,615; it was 13,919 (Federal estimate) in 1916. The area exceeds fourteen square miles.

The chief point of interest in the city is the famous ship canal whose great locks permit the passage of vessels from the Saint Mary's River to Lake Superior, navigation being otherwise interrupted by the rapids in the stream (see SAULT SAINTE MARIE CANALS). The river is here spanned by an international bridge one mile in length. Prominent features of the city are a Federal building, Carnegie Library, a $175,000 high school building, a railroad hos-

pital, the city armory, Fort Brady and the United States Government Park (150 acres) along the river. "The Soo" is a favorite summer resort, since the summers are delightfully cool. Electrical energy, obtained from the river, is used to operate large paper and lumber mills, one of the largest carbide plants in the United States, flour and woolen mills, a leather factory with an annual output worth $300,000, and dredging-machinery works. The city also has important fish-packing interests.

Could the history of the Indians of the North be written, the site of Sault Sainte Marie would doubtless have an important place in that record. It was visited by the French missionaries Rambault and Jogues in 1641, and in 1662 Pere Marquette established there the first permanent settlement within the present limits of Michigan. At the great congress of Indian nations assembled there in 1671, the French, by proclamation, assumed possession of the territory between that point and the Gulf of Mexico and westward to the Pacific Ocean. The town was incorporated in 1879 and became a city in 1887. C.E.C.

SAULT SAINTE MARIE CANALS, popularly called the Soo CANALS, two artificial waterways, one in Michigan and one in Ontario, by which vessels pass between lakes Superior and Huron. The construction of the canals was



SAULT SAINTE MARIE CANALS

(1) American canal and locks; (2) Canadian canal and locks; (3) power canal; (4) Sault Ste. Marie, Michigan; (5) Sault Ste. Marie, Ontario.

made necessary by the rapids of the Saint Mary's River, which forms the natural connection between the two lakes. These canals carry more tonnage each year than the Suez, Manchester, Kiel or Kaiser Wilhelm and New York State Barge canals combined. In 1916 the number of ships passed through the locks was 25,407, bearing a total of 54,922 passengers and 91,999,219 tons. The previous high record in tonnage, 79,718,000, was carried in 1913. Iron ore comprises eighty per cent of the east-bc freight, and coal ninety per cent of the v bound.

The Canadian Canal. The early trappers to carry their canoes and furs around the ids, but in 1798 the Northwest Fur Com completed a canal through which canoes bateaux could ascend the river. This c had a single lock, which was thirty-eight long and eight feet nine inches wide and h lift of nine feet. It was destroyed by An can soldiers in 1814. The present Cana canal was begun in 1888, and was complete 1895 at a total cost of $4,994,373. The C dian canal is 7,067 feet, or one and one-f miles long between the ends of the entr piers, 150 feet wide at the surface and twe three feet deep. The lock is 900 feet lon sixty feet wide, and has a lift of eighteen The canal is cut through Saint Mary's Isl on the north side of Saint Mary's River. tonnage of freight carried through the C dian Canal averages 30,000,000 a year; record tonnage, 42,699,394, was carried in 1

The American Canal. On the United St side there was at first a tramway for the t veyance of freight and passengers around rapids. The first canal was completed in 1 by the state of Michigan, which retained ownership until 1881, when it was transferre the United States government. This canal two masonry locks, each 350 feet long and v a lift of nine feet. These locks were destro in 1888 by the excavation for the Poe lock.

The oldest of the present locks is the Wei lock, completed in 1881 under the direction General Godfrey Weitzel (1835-1884). ' Weitzel lock is 515 feet long and has sevent feet of water on the sills. The Poe lock, j north of the Weitzel lock, was completed 1896 and was named for General Orlando Poe (1832-1895), the army engineer in cha of construction. This lock is 800 feet lc and has twenty-two feet of water on the s The Weitzel Lock cost $1,000,000 and the 1 Lock cost $3,000,000. While the Poe Lock v under construction the Canadian governm completed the canal described above.] many years the Canadian canal, being sligh deeper, was used by the barge vessels, althou the total tonnage of freight was divided fai evenly between the two canals.

In 1909 the United States government beg the widening of the old canal channel from 2 to 230 feet and the construction of the Da Lock, or Lock No. 3. During 1914 a new ca

was excavated to the Davis Lock, and the lock and canal were opened in October. The Davis Lock is 1,350 feet long between the inner gates, is eighty feet wide, and has a minimum depth of 24¼ feet on the sills. The new canal to this lock is 260 feet to 300 feet wide. The increased depth of the Davis Lock permits the largest lake steamers to use the American canal, and the lock is large enough to hold two of them at one operation. The lock can be filled or emptied in six minutes. The construction of the Davis Lock and the new canal involved an expenditure of $5,000,000; the widening and deepening of the old canal cost $4,400,000, and improvements of the channel in the river cost $9,400,000. In 1912 Congress authorized the construction of a fourth lock, directly north of and exactly similar to the Davis Lock. The excavation for Lock No. 4 was completed in 1914, and the lock will probably be completed in 1917 or 1918. C.E.C.

Related Subjects. The general article CANAL should be read in connection with this article. A list of American and Canadian canals is there given. Valuable collateral information is also contained in the articles:

Erie Canal
New York State Barge Canal
Panama Canal
Suez Canal

SAUNDERS, *sahn'derz,* MARGARET MARSHALL (1861-), a Canadian author of animal stories. *Beautiful Joe,* her best known book, has been translated into German, Swedish, Bulgarian, Chinese and other foreign languages and has reached a circulation of more than 500,000 copies. This book won a prize offered in 1894 by the American Humane Educational Society, and then journeyed for six months from publisher to publisher before one was found who was willing to risk publishing it. To-day there are millions of children and men and women, who have read this classic among animal stories. Among Miss Saunders' other books are *Charles and His Lamb; Deficient Saints; For His Country; Beautiful Joe's Paradise; Princess Sukey,* and *Alpatok: The Story of an Eskimo Dog.* Miss Saunders was born at Milton, N. S. She has taken an active part in many philanthropic projects, notably those for preventing cruelty to animals.

SAUSAGE, *saw'sayj,* a food preparation consisting of finely chopped meat, highly seasoned. If prepared in a packing house it usually has a casing made from the intestine of some animal; household sausage is generally encased in a long, cotton sack. In the great packing houses of the United States, where the manufacture of sausage is one of the most profitable branches of the meat-packing industry, the meat chiefly used consists of trimmings, particularly those from the head and hoof. The meat is first minced, then mixed with potato flour and water, two-fifths of the total content being meat, two-fifths potato flour, and one-fifth water. The seasoning added includes such spices as sage, pepper, salt, ginger and mustard. The sausage casings are cleaned by machinery, and are filled with meat through a tube attached to the open end of a stuffing machine. Such sausages usually are sold in strings, whence the expression "link sausage."

Among European varieties of sausage, the Bologna sausages of Italy and the smoked sausages of Germany are held in high favor. The former consist of veal, salt beef, salt pork and bacon, seasoned with sage, ground pepper and mixed spices and herbs. The German sausage is made of fat and lean pork which has been rubbed with saltpeter, black pepper and allspice and preserved for about a week. After being cut up, the meat is mixed with shreds of garlic, pressed into a casing made of ox skin, wrapped in muslin and then smoked in the manner of ham. The ancient Romans highly esteemed a sausage made in Lucania, Southern Italy, containing fresh pork and bacon, nuts, herbs and spices.

Sausages are marketed under various trade names, including Arles, banquet, Bologna, country, Holsteiner, Frankfort, Lyons (made of pure ham), pork, salmi, summer, tongue and Wienerwurst. They consist, in varying proportions, of water, protein, fat and ash. Sausage meat is not, generally speaking, classed among the highly digestible foods. Pork sausage has about the same nutritive value as smoked lean bacon or fat pork chops, and Frankfort sausage averages with fat loin of veal. Sausages are prepared for the table in various ways, boiling, frying and broiling being common methods of cooking. Bologna sausage requires no cooking, but is sliced and eaten as a cold meat. See MEAT AND MEAT PACKING.

SAVANNA, *sa van'a,* a large tract of land covered with vegetation which consists chiefly of tall, stiff grasses growing in dense tufts, and low trees irregularly distributed. The pampas of South America, the prairies of Central North America, the steppes of Europe and the plains of Central Africa are all savannas, varying somewhat in character of vegetation. Most of these plains furnish excellent grazing districts for cattle. The savannas of Central Africa are

the homes of immense numbers of large animals, the "biggest game" of the world, and the prairies of America are rich agricultural regions.

SAVANNAH, GA., the greatest seaport on the Atlantic coast of the United States south of Baltimore, and, next to Atlanta, the largest city of the state in population. Historically it is one of the most interesting cities of the South. It is the county seat of Chatham County, and is situated eighteen miles from the sea on the Savannah River, which here separates Georgia from South Carolina. Atlanta is 260 miles northwest, and Jacksonville, Fla., is 172 miles south. Railroad transportation is provided by the Southern, the Central of Georgia, the Atlantic Coast Line and the Seaboard Air Line. There is water transportation by river boats to Augusta and by steamers to other Atlantic ports and to Europe. The population increased from 65,064 in 1910 to 68,805 (Federal estimate) in 1916; negroes comprise about one-half of this number, and about 3,500 are foreign born. The area of the city is nearly seven square miles.

Description. The city is built on a plateau about fifty feet above sea level, and has a mild climate, due in part to the influence of the Gulf Stream. The wide streets, which cross each other at right angles, are so abundantly shaded with magnificent moss-hung oaks and with magnolia and palmetto trees that the city is popularly known as the *Forest City*. Toward its center is Forsyth Park, whose tropical vegetation makes it one of the most attractive parks in the South. Its extension, called the "Parade Ground," a military plaza owned by the militia companies of Savannah, contains a magnificent monument to the Confederate dead.

The park reservations cover about 180 acres, including about thirty squares, which contribute greatly to the beauty and charm of the city. In some of these squares monuments have been erected to General Oglethorpe, who founded the city, General Nathanael Greene, William Washington Gordon, Count Pulaski and William Jasper. Colonial, Oglethorpe Avenue and Daffin are the most noted of the larger parks. Estill Avenue, Gaston, Bull and Abercorn streets, with their stately mansions, fountains and sunken gardens, are among the most beautiful boulevards in the residential district. Near the city are several islands, frequented in winter and in summer for their fine beaches.

Buildings and Institutions. The principal commercial thoroughfare, Bay Street, contains the city hall, built in 1906 on the site of the old one erected in 1779, the Cotton Exchange and the customhouse. A Federal building, county courthouse, Masonic Temple, Union Station, Knights of Columbus and Knight Templar buildings, three armories, the Telfair Academy of Arts and Sciences, the city auditorium, Savannah and Hicks hotels and some handsome modern bank buildings are among the most notable structures of the city. For advanced education there are the Benedictine College, Chatham Academy, Georgia State Industrial College (for colored students), and the public libraries. The benevolent institutions include Savannah and Saint Joseph's hospitals, Oglethorpe Sanitarium, Georgia Infirmary for colored people, and homes for the orphaned, the aged and the friendless. Christ Church, erected in 1838, replaces the old one built in 1740. On this site John Wesley, the founder of Methodism, first preached in America.

Commerce and Industry. The steamship companies and railroad terminals, which occupy four miles of wharves, provide modern facilities for shipping freight. Savannah is one of the largest naval-stores ports and one of the largest export ports for sea island cotton in the world. It also ships great quantities of rice, lumber, sugar cane, fruits and vegetables, the products of a large fertile surrounding territory, cotton goods, cottonseed products, turpentine, rosin, fertilizer and phosphate. Although Savannah is primarily a shipping center, its manufactures are of considerable importance. Besides the manufactures listed among its exports, it makes foundry, machine-shop and lumber-mill products. There are also large railroad car and repair shops here. The rice mills and cotton compresses are features of special interest to tourists.

History. The settlement made at Savannah in 1733 under James Edward Oglethorpe was the first European colony in Georgia; a granite seat in Bay Street marks the spot where the first tent was pitched (see illustration, page 4345). Among later arrivals were John and Charles Wesley, who came in 1735 but two years afterward returned to England. The city was the seat of government for Georgia until it was taken by the British under Colonel Campbell in 1778. The first legislature met in Savannah in January, 1755, and in 1775 the first Provincial Congress was convened there. In 1779 the city was unsuccessfully attacked by a French fleet under D'Estaing and an army under General Benjamin Lincoln. At this time

Count Casimir Pulaski and Sergeant William Jasper were mortally wounded. Ten years later the city was incorporated.

During the War of Secession it was the depot of supplies for the Confederate army; hence it became the objective point in General Sherman's famous march to the sea, and was taken by him in December, 1864, and held by the Federals until the close of the war. Twice the city was ravaged by fire; the loss in 1796 was estimated at $1,000,000 and in 1820 at $4,000,000. The first steamship to cross the Atlantic Ocean, the *City of Savannah,* sailed from this point to Liverpool in 1819. T.P.

SAVANNAH RIVER, a river which forms a large part of the boundary between Georgia and South Carolina. The main stream is formed by the junction of the Tugaloo and the Seneca (or Kiowee) rivers, which rise near the southern boundary of North Carolina and unite on the Georgia-South Carolina boundary a few miles west of Anderson, S. C. From this point the river flows in a south-easterly direction, emptying into the Atlantic through Tybee Sound. A channel twenty-eight feet deep has been cut from the ocean to the city of Savannah, a distance of eighteen miles, for the use of heavy vessels (see SAVANNAH). Smaller vessels can ascend the river 230 miles, as far as Augusta, Ga., a city of cotton mills. The main stream is about 450 miles long.

SAVE, *sahv,* a river of Europe which rises in Austria in the crownland of Carniola and falls into the Danube at Belgrade, Serbia, about 450 miles from its source (see map of Europe following page 2092). It is navigable for steamers for over three-fourths of its course, though occasional shallow places, shifting sandbanks and a varying current offer difficulties to navigation. The principal tributaries of the Save are the Kulpa, the Unna, the Vrbas, the Drina and the Bosna. The Drave, another tributary of the Danube, and the Save flow in courses almost parallel.

SAVINGS BANKS. Until modern times Christian people were forbidden by their Church to accept interest in return for the use of their money. This prohibition and that in *Deuteronomy,* "Thou shalt not lend upon usury to thy brother" (in which *usury* means merely interest, not excessive interest), were justified by the fact that in former days people never borrowed money unless in trouble, when kindness would inspire a gift instead of a loan. But with the advent of the age of capital and industry, and the development of the idea that those who do not have present need of their money can serve the world by lending to those who are able to employ it productively, religious objections to interest vanished. Towards the end of the eighteenth century men began to see that the hope of interest might encourage people who otherwise squandered their earnings and swelled the ranks of the poor, to see, with Ben Franklin, that

> A penny saved is two pence clear,
> A pin a day 's a groat a year.

Then the churches began to encourage the establishment of savings banks, the first of which had been founded in Brunswick, Germany, in 1765.

Though the first savings banks in the United States, founded in 1816, were called the Philadelphia Savings Society and the Provident Institution of Boston, savings banks in America have on the whole been business enterprises rather than charitable foundations. In Great Britain and some other countries, on the contrary, depositors are guaranteed a fixed rate of interest by the government, which is obliged to pay out money every year because the banks do not earn enough to pay the established rate. In the United States there are two important classes of savings institutions, the *mutual* banks, whose depositors are its owners, and the more numerous *stock* banks, whose stockholders make a profit by investing the money given to them as savings. For both types the state government, in order to protect depositors, usually prescribes the nature of investments that may be made. But though these banks guard $5,000,000,000 in savings for more than 11,000,000 people, the greater part of the savings funds of the country are in the savings departments of regular banks (see BANKS AND BANKING).

In Canada there are a few banks specially for savings, but, as in the United States, the chartered banks handle most of the savings accounts.

Postal Savings Banks. England was the first country to utilize the organization of the postoffice and the confidence which people feel in their government, in a savings scheme. The English system was inaugurated in 1861 and was copied in Canada six years later. Though nearly all prominent nations have had postal savings banks for a number of years, the United States did not establish them until 1910.

In order to insure that postoffice banks shall benefit only those whose funds are small, there is in Canada a rule that the deposits of any one person must not exceed $1,000 in any one

year, nor total more than $3,000. In the United States the regulation is that the total interest-bearing deposits of an individual shall not be above $1,000, but larger amounts are accepted if the depositor wants no interest. No one may deposit less than one dollar at a time, but savings of smaller amounts may be made by purchasing a ten-cent card and attaching ten-cent stamps to it until it is worth one dollar. Two per cent interest is paid in the United States, three per cent in most other countries. W.F.Z.

School Savings Banks. In Europe, special banking arrangements for school children have existed for a century, but in the United States only since 1885. The usual method is for a school to accept deposits from its children, and to place the total sum in a savings bank. When a child has a certain sum, say one dollar, to his credit, he is given an individual account. Money cannot be withdrawn except in the presence of a parent or guardian and with the written consent of the teacher. Millions of dollars have been saved by American children in this fashion. The stamp system is less successful because stamps may be lost or sold.

In Canada. The Parliament of Canada passed an act authorizing the establishment of school savings banks in 1906. The act requires that all money collected in school banks shall be deposited in the Government Post Office Fund. The head office of the Canadian Penny Bank System is in Toronto. By law the work of the managing board must be done without any remuneration. In Ontario the Boards of Education are authorized by statute to purchase the necessary books and stationery. A bank in each district receives the amount collected each week, and once a month forwards to the head office the amount collected for the month. Each child is given a book in which his deposits are entered. There are over $400,000 on deposit in the Penny Banks of Canada. J.L.H.

SAVONAROLA, *sav o na ro' la,* GIROLAMO (1452-1498), an Italian monk and reformer, born at Ferrara. In youth he became familiar with medieval learning, and it is thought that an unhappy love affair caused him to discontinue his medical studies and become a monk. He joined the Dominican Order at Bologna in 1475, where he gave himself up to the severest kind of penance and humility.

In 1482 Savonarola began to preach—fiery, spontaneous outbursts of indignation against the wickedness of the world; he went from Ferrara to Florence, then to Brescia, and again, in 1490, back to Florence. The following year found him elected prior of Saint Mark's. sermons were impassioned denunciations of isting conditions in both Church and St Lorenzo de' Medici, of the reigning house (Florence was not at this time a democr republic), tried to win over Savonarola to his side, but his death in 1492 prevented the accomplishment of this. Thereafter the Piagnoni, or Democratic party, came into power and Savonarola was greatly strengthened by their fervent support. The vasion of Charles VIII of France only ad to the confusion and hastened the destruc of the Medici.

SAVONAROLA

A great change swept over the pleasure-ing city of Florence while Savonarola, as tator, swayed the emotions of the people his fervent puritanical exhortations. He pected too much, however, of the Florenti their ardor cooled, and wearying of virtue t deserted their leader. Pope Alexander VI not escaped the reformer's bitter attacks fearful of his increasing power, decided to communicate him. For refusing to listen the Pope, Savonarola was deprived of his dependence by the joining of Saint Mark' a new branch of the Dominican Order.

A Franciscan friar challenged Savonarol prove the truth of his teachings by an or by fire; this was undertaken, but the experin was not carried out, as a heavy rain quenc the flame while they were still wrangling preliminaries. The zealous monk's life was t in constant danger. The infuriated mob been deprived of an exciting spectacle, demanded his arrest and trial for heresy. prison he was tortured to such an extent he became physically incapable of resisting tacks. With two fellow victims he was fin executed by a slow and tortuous process, to very end refusing to recant.

Mystical, given to dreams and visions, thusiastic and too zealous to be a good ju of what the Florentines would be ready to cept, Savonarola suffered a martyr's death, it was a death ennobled by high ideals unswerving devotion to his chosen work. final words on the scaffold, in reply to

bishop's formula, "I separate thee from the church militant and the church triumphant," were "Not from the church triumphant; that is beyond thy power." M.R.T.

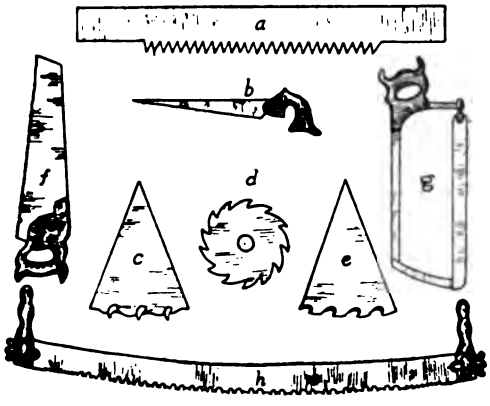
Consult Lucas's *Fra Girolamo Savonarola;* McHardy's *Savonarola,* in World's Epoch Makers Series.

Related Subjects. The following articles in these volumes contain information which will be of interest in connection with this study of Savonarola:

Alexander (Pope)	Medici, subhead *Lorenzo the Magnificent*
Charles VIII (France)	
Dominicans	Ordeal and Combat, Trial by
Florence	

SAVOY', HOUSE OF, the oldest reigning European dynasty, to which all the kings of United Italy have belonged. The house was founded by Humbert, first Count of Savoy, who flourished between 1003 and 1056. For history of the dynasty see ITALY, subtitle *History of Italy.*

SAW, a cutting tool consisting of a metal blade, one edge having teeth set at slight angles to enable them to cut through wood, stone



VARIOUS SAWS

(*a*) Gang-saw blade; (*b*) compass saw; (*c*) section of inserted-tooth circular saw; (*d*) circular grooving saw; (*e*) section of chisel-tooth circular saw; (*f*) handsaw; (*g*) meat saw; (*h*) crosscut felling saw.

or metal. There are many kinds of saws, each designed to meet certain requirements.

A *circular saw* consists of a circular plate of tempered steel, armed with teeth. This saw is now used in most lumber mills of average size. The saw is often as large as seven feet in diameter, is revolved by machinery, the power being supplied by steam, electricity, water or gasoline, and is capable of sawing through 200 feet of wood, board measure, per minute. Circular saws are now made to cut disk-shaped pieces of wood as well as straight flooring boards and building material.

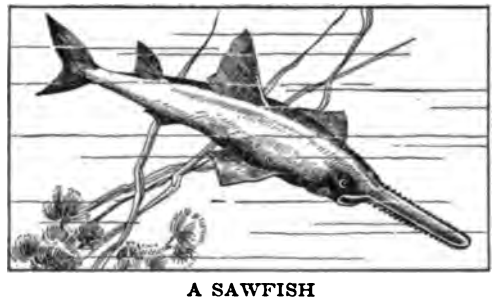
Band saws consist of bands of steel with teeth, the band being passed over and operated by pulleys. This saw is extensively used for making barrel staves and many of the thinner parts of furniture. The band saw and the circular saw are both stationary, the wood being placed on a table and pressed against the cutting edge of the saw.

A crosscut saw, chiefly used in cutting logs, is about eight feet long and provided with teeth which cut in the backward as well as the forward motion of the saw. The blade has a handle at each end and the saw is operated by two men who alternately pull the saw across the surface of the wood. No pressure is applied, the weight of the saw being sufficient to enable it to cut through the hardest woods.

Butchers' and machinists' saws are made of tempered steel and have very narrow blades with fine teeth. A wood saw has a narrow blade mounted on a frame of light but strong wood. These operate on the principle of the crosscut saw, but are short and are operated by one man.

Gang saws consist of a dozen or more saws placed parallel to one another at equal distances apart. Such saws cut a vast amount of lumber, reducing the roughly squared timber of an entire log to boards of the required thickness in one operation. The saws are set as far apart as the thickness of the boards to be cut, and the sliding frame on which the logs are placed is moved forward against the saws. The productive power of gang saws is almost unlimited. F.ST.A.

SAWFISH, a family of ray fish whose chief characteristic is the possession of a flat, sword-like snout, which is used as a weapon of offense and defense. Each side of the "saw" is provided with a series of sharp teeth, and with



A SAWFISH

it the fish viciously tears open the bodies of its victims, which are said to include such large marine animals as whales. Shoals of small fishes suffer particularly from attacks of saw-

fish, and they have been known to drive the saw through the hulls of ships. There are five species, distributed through the warm parts of the ocean. They are large fish, some of the saws being six feet long and a foot wide at the base. An American species, common in the coast waters of the Southern United States, grows to be fifteen feet long, including the saw. It makes its way up the Mississippi River for many miles from its mouth, and does considerable damage to fishermen's nets.

SAXE, *sax,* JOHN GODFREY (1816-1887), an American humorous and satirical poet. He was born at Highgate, Vt., educated at Middlebury College and admitted to the bar. Thereafter he served as attorney-general and as editor of a Burlington, Vt., newspaper, before going to Albany, N. Y., where he edited the *Evening Journal* and became well known through his writings and his lectures. Saxe ranks next to Holmes in humorous poetry, and his verse is always bright and attractive. Among his publications are *The Money-King and Other Poems, Leisure-Day Rhymes* and *Fables and Legends of Many Countries.*

Saxe's literary style is well shown in the following stanza from one of his poems:

> God bless the man who first invented sleep;
> But blast the man, with curses loud and deep,
> Who first devised, then went 'round advertising
> That artificial cutoff, early rising.

SAXIFRAGE, *sak'si frayj,* derived from a Latin word meaning *stone breaking,* is the name applied to a genus of plants, many of which grow in stony soil or from clefts in rocks. They are found for the most part in cold and temperate regions of the northern hemisphere. The leaves of some of the European varieties are eaten as salad, and the root is used medicinally. These hardy plants have stalks from one to two feet high, while the foliage varies, being mossy, leathery-leaved or silvery. The many tiny seeds are enclosed in little capsules, and the blossoms are of all colors. Some of the species are grown for ornamental purposes. Among the best known are *lady's cushion, beefsteak* or *strawberry geranium, none-so-pretty, golden saxifrage* and *swamp saxifrage.*

SAXONS, *sax'unz,* a Germanic people who took part in the invasions of the island of Britain in the fifth and sixth centuries and so contributed to the founding of the English kingdom. The Saxons first appear in historical records in a book written by Ptolemy in the second century. They seem then to have occupied the land corresponding to Schleswig, but by the sixth century they had spread t Northwestern Germany as far east as the E River. The Saxons who remained in Ger were subjugated by Charlemagne, who fo them to accept Christianity and made t country a part of his empire. During the n century a Saxon duchy was established, this passed out of existence after three ce ries. The name Saxony, which was origin applied to the home of the Saxons, cam time to be the designation of a kingdom in east of Germany.

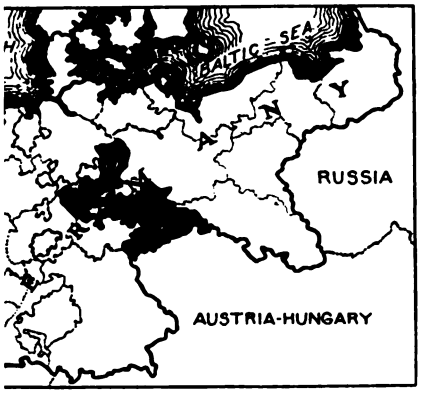
Related Subjects. The reader is referre the following articles in these volumes:

Anglo-Saxons	England, subtitle His
Charlemagne	Saxony

SAXONY, *sak'suni,* KINGDOM OF, the th state in the German Empire in population: the fifth in area. In proportion to its siz is the busiest industrial section of Germ It holds first rank in the production of text and contains some of the most important c ters of iron manufacture. This small trian lar kingdom lies on the eastern frontier of G many, with Prussia on the west, north and e Bavaria on the southwest and Bohemia Austria-Hungary) on the south. It has area of 5,789 square miles and a population 4,806,661. In Saxony there are about 829 p ple to the square mile, the density of popu tion far exceeding that of any other Ger state. There are two cities of more than hal million population, Leipzig and Dresden (b of which see); Chemnitz, Plauen, Zwick Meissen, Zittau, Freiberg and Bautzen all h more than 30,000 inhabitants.

The country is traversed by the Elbe Riv the only stream of any great commercial i portance, and has an agreeable, moderate c mate. The fertile soil receives an abundan of rain, and produces large crops of wheat, r barley, oats, potatoes and hay. Orchards, vi yards and flax fields also flourish. Among m eral products, silver, coal, iron, lead, tin, m ble and precious stones are important. Th are a number of mineral springs, those at B Elster being visited by large number of hea seekers. Besides the prosperous textile fac ries Saxony has large establishments produc furniture, paper, watches, glassware, pianos, m chinery and many other commodities. At Me sen is the famous porcelain factory where Dr den china (which see) is produced. Anoth profitable source of income is the forest ar nearly half the wooded land (one-fourth t total area) belongs to the state, and there

)l of forestry at Tharandt. Education-
: kingdom is one of the most important
many. Leipzig has a great university
'amous royal music school, and Dresden
d as an art, musical and literary center.



SAXONY
Kingdom of Saxony; (*b*) a small Prussian
e, bearing the same name.

name Saxony was originally applied to
section in Northwestern Germany in-
l by the Saxons (which see), and this
y was quite distinct from the modern
n. It was late in the Middle Ages be-
e name was applied to the territory in
t of Germany from which the modern
developed. The present limits of the
n were defined in 1814 by the Congress
na, after the defeat of Napoleon at Leip-
axony joined the North German Con-
ion at the close of the Seven Weeks'
which see), in which it was allied with
against Prussia, and in 1871 it became
ber of the German Empire (see GER-
historical summary on pages 2478 and
Saxony suffered more domestic priva-
han many of the other parts of the
1 Empire in the War of the Nations. Its
position was in part responsible for its
inate condition, but inadequate crops
in no small degree to the despair of the
The kingdom sends four members to
ional Bundesrat and twenty-three depu-
the Reichstag. B.M.W.

OPHONE, *sax'a fohn,* a deep-toned
musical instrument, used with good effect
ary bands, but not adapted to orchestral
the tones are not sufficiently fine and
hetic. The instrument is rarely used in
ork. Its name comes from that of
. Sax, who invented it in 1840. The in-
nt is a conical tube, curved upward at
ttom and having a small part turned
backward at the top, where the mouthpiece and a reed like that of the clarinet are fitted. Twenty keys are arranged on its uncurved length, which are manipulated by the first three fingers of each hand. Saxophone music is written in the treble clef.

A SAXOPHONE

SCALE, in music, a succession of notes arranged in alphabetical order from a given note. The simplest series is the octave of eight notes, or the *major scale,* which contains five whole steps and two half-steps, the latter between three and four (*mi* and *fa*) and seven and eight (*ti* and *do*). This scale does not make use of all the tones within the octave, for if all the half-steps are counted the octave will be seen to contain twelve tones. A scale containing all of these twelve tones is said to be *chromatic.* Another term often used in connection with scale is *minor;* by minor scale we mean one which begins on the sixth tone of the major, or *la.*

These various points are discussed in these volumes in the article MUSIC, under the subheads *A Lesson on the Major Scale, How to Remember Scales, A Lesson on the Chromatic Scale* and *A Lesson on the Minor Scale.*

SCALE IN'SECT, or **BARK LOUSE,** a family of insects including several species that are very destructive to fruit plants. They are so called because they secrete scales consisting of cast skin and excreted matter. These scales, which form a body covering, are sometimes white and powdery and sometimes glassy or shell-like. The scale insects injure plants by sucking the sap. Of the 1,400 or more known species, nearly 400 are found in America, but in many instances they are not recognized as insects by fruit growers because they are so unlike the typical members of that class. The small black or brown spots sometimes seen on oranges are scale insects, and there is one species in which the females resemble small oak galls.

Probably the best known of the group is the San José scale of California. The San José scale belongs to the most pernicious division of the family, the adult females of which are decidedly a degenerate type of insect. That is, they remain motionless during the greater part of their existence, and are lacking in legs, wings, eyes or feelers. Other common American scales are the cottony cushion and the cottony maple scales, the scurfy bark louse, the pine-leaf and the rose scales and the mealy bug. Cochineal and lac are commercial substances produced by insects of this family.

Consult Howard's *Insect Book;* Comstock's *Manual for the Study of Insects.*

Related Subjects. For further information relating to this subject the reader is referred to the following articles:

Cochineal	Lac
Insect	Mealy Bug
Insecticides and Fungicides	San José Scale

SCALES, *skaylz,* the thin, flat plates which form the outer covering of most fishes and of many serpents and lizards. A few mammals are also scale-covered, such as the scaly anteater. Scales consist usually of a horny substance, and they overlap one another like shingles, forming a protective armor for the softer body; they vary in size, shape and arrangement according to the size and kind of animal they cover. In botany, scales are little, flaky leaves which cover buds on trees and woody plants in cold and temperate climates, to shield them from sudden changes in temperature. The regular sections of fir cones have the same name. The wings of butterflies and moths are covered with scales so tiny that they appear like little specks of down.

SCALLOP, *skahl'up,* a group of bivalve shellfish related to the oysters. The two valves of the shell covering are shaped like fans, and in some species they are marked with prominent ridges which radiate from the hinge. The shell ends in an earlike extension, in which the hinge is placed. Along the margin of each mantle fold (the membrane lining the shell) are a row of slender tentacles and a fringe of bright blue eyes. Adult scallops have a rudimentary foot with which they plow through the mud. In swimming, the animal opens the valves quickly, catching a quantity of water between the mantle folds, and then closing its shell. Because of pressure within, the water is forced out in jets through round openings on the hinge, and the resulting movement against the water outside pushes the animal along in a zigzag fashion, with the broad end of the body forward.

Two species of scallop are found along the Atlantic shores of North America—the *common* scallop, abundant in bays and inlets from the Gulf of Mexico to Massachusetts Bay, and the *great* scallop, occurring north of Vineyard Sound, especially along the coasts of Maine, Nova Scotia, Labrador and in the Gulf of Saint Lawrence. The latter is the larger of the two, sometimes growing to be four or five inches wide. The only part of these animals sold as food is the adductor muscle, which the scallops use to open and close their valves. This muscle tastes like lobster meat and is considered a great delicacy, as it is soft and tender. Scallops are caught in great numbers along the coasts of New England. Their shells are "planted" in oyster beds to provide lodging places for oyster spat.

In the Middle Ages pilgrims to the Holy Land wore in their hats a scallop shell as a token of their pilgrimage.

SCALP, *skalp,* the outer covering of the skull. It is composed of skin, the tendon of the muscle that moves the skin of the forehead, blood vessels and cellular tissue. It is on the scalp that the hair grows most abundantly, but otherwise the skin of this portion of the body is much like that of any other. The hygiene of the scalp is closely related to that of the hair. Injuries to the scalp should be treated with scrupulous care to prevent infection; neglect may result in erysipelas and other diseases. In Indian warfare it was customary to cut off from the head of a victim a circular piece of skin and hair, about four inches in diameter; this custom was known as *scalping,* and the detached portion, which a brave would proudly display as a trophy of war, was called a *scalp.*

Related Subjects. The reader is referred to the following articles in these volumes:

Dandruff	Hair, subhead *Care of the Hair*

SCAMMONY, *skam'o ni,* a twining, climbing plant, native to Asia Minor, having white flowers and thick, fleshy roots usually two or three feet in length. From the roots is obtained a milky, white juice, which, upon drying and hardening in the air, forms a gum resin of medicinal value. It is used in laxative preparations, as the resin is a powerful cathartic.

SCANDINAVIA, *skan di na'vi a,* the name given in a restricted sense to the peninsula of Norway and Sweden, but more broadly used to designate the lands inhabited by Scandina-

vian people, Denmark, Iceland, Norway and Sweden. The word *Scandia* originated with the Romans, who used it to describe a large island, believed to be north of the Baltic Sea. The southernmost portion of Sweden is still known as Scandia; it was not known in Roman days to be connected with the mainland at the north.

Related Subjects. The reader is referred to the following articles in these volumes:

Denmark	Norway
Iceland	Sweden

SCAPEGOAT, *skayp'goht,* one of two goats received by the Jewish high priest on the Day of Atonement, upon which he cast lots, one for Jehovah and one for Azazel (*Leviticus* XVI, 10). The first was killed as a sin offering, and upon the second, or scapegoat, the priest laid his hands, confessing over him the people's sins and then sending him into the wilderness as a token that the sins had been put away. The original significance of "Azazel" has been lost, but it doubtless refers to the spirit of evil.

In modern usage, a person made to bear the blame of others is called a scapegoat.

SCARAB, *skair'ab,* a group of beetles having the peculiar habit of rolling up bits of refuse into pellets and using them as food for themselves and young. The sacred scarab of the ancient Egyptians is the best known of the group. The Egyptians regarded the pellets as symbols of the world, and projections on the heads of the beetles were considered emblems of the rays of the sun. The scarab was also a symbol of the resurrection and of immortality, and figures of the insects were carved out of stone or metal and used as charms. Such devices were called scarabs. Usually the heart of a deceased person was removed, and in its place was put a large scarab. These insects belong to the same family as the tumblebugs, June bugs and cockchafers.

SCARLET FEVER, *skahr'let fe'ver,* an acute infectious disease to which children are especially susceptible. Its most striking symptoms are sore throat and a rash that breaks out all over the body. *Scarlatina* is another name for this disease. An attack of scarlet fever begins usually with vomiting, headache, shivering and sore throat. From three to fourteen hours after the spell of vomiting the rash may be noticed on the chest, and a high fever develops. The eruption, which is followed by peeling, fades in about a week, and the temperature drops to normal in about the same period. The throat is the organ which must be watched and treated with the greatest care. A victim of this disease should be isolated immediately after the attack begins, be placed in a quiet, well-ventilated room and be put on a liquid diet. The physician in charge will prescribe measures to control the fever and give directions as to bathing and the use of antiseptic sprays for the throat.

Among the dangers connected with scarlet fever are ear and eye complications, resulting in impaired hearing and sight. In some cases the poison of the disease affects the brain and causes nervous prostration. The heart and kidneys are other organs frequently affected. As discharges from the nose, throat and ears are carriers of scarlet fever, the strictest precautions must be taken to prevent its spreading. All secretions must be destroyed and bedding and wearing apparel be thoroughly disinfected. There are several forms of the disease, varying in intensity and degree of fatality. The organism which causes scarlet fever has not been identified.

SCARLET LETTER, a famous novel by Nathaniel Hawthorne, considered by critics to be one of the finest and loftiest examples of fiction in American literature. It was published in 1850, and was the first of the author's long novels—possibly his masterpiece. The scene is laid in a colonial village of Massachusetts, and the story has a background of Puritan intolerance in the colonial period. Written in that clear and flowing style which was one of Hawthorne's best literary traits, it reveals the spiritual effect on two characters of sin concealed and sin revealed. These characters, the Reverend Arthur Dimmesdale and Hester Prynne, are the hero and the heroine. A bright element in this somewhat austere book is the occasional appearance in the narrative of little Pearl, the child of Arthur and Hester. The novel is universally admired for its fine descriptions and faithful and sympathetic delineation of character, and for the masterly way in which it points a great moral. At the same time it is absolutely free from any trace of "preaching." The title refers to a scarlet letter *A* worn by Hester on her dress as a badge of her sin.

SCHAEFFER, *sha'fer,* NATHAN C. (1849-), an American educator and author, born in Maxatawny Township, Pa. He was graduated at Franklin and Marshall College in 1867 and then pursued advanced courses in the universities of Leipzig, Berlin and Tübingen. Returning to his native country and state, he taught for two years in Franklin and Marshall College and in 1877 was appointed principal of

the Keystone State Normal School. In 1893 he became superintendent of public instruction in Pennsylvania, and during his long incumbency of that position brought his state into the front rank in educational matters. Professor Schaeffer has served as president of the National Education Association, as chancellor of the Pennsylvania Chautauqua, and has held other educational positions, and is widely known as an editor and author. His most important publications are *Thinking and Learning to Think* and *History of Education in Pennsylvania.*

SCHELDT, *shelt,* a river of Belgium which forms one of the most important commercial waterways of Europe. Its navigation has been made the subject of international treaty, and its waters were declared free to all nations in 1863, after Holland had maintained control of navigation privileges for over two centuries. During the War of the Nations, which began in 1914, Germany made an unsuccessful attempt to have the river declared free from Belgian jurisdiction. This was refused by the allied powers.

The Scheldt rises in the northern part of France in the department of Aisne, entering Belgium near Bleharies. In Belgium it follows a northeasterly course until it reaches Antwerp, fifteen miles below which it separates into two channels, the East and West Scheldt. These form a double estuary which flows into the North Sea. The river is 250 miles in length and has been made navigable for about 210 miles by means of locks. It is connected by canals with the chief cities of France and Belgium. Important among the cities on its banks are Oudenarde and Ghent.

SCHENECTADY, *skeh nek' ta di,* N. Y., the county seat of Schenectady County, is a growing industrial city in the east-central part of the state, sixteen miles northwest of Albany and 165 miles north of New York City. It is on the Mohawk River and the New York State Barge Canal (which see), and on the New York Central and the Delaware & Hudson railroads. Electric interurban lines extend to a number of neighboring cities. Between 1910 and 1916 the population increased from 72,826 to 99,519 (Federal estimate).

Schenectady occupies an area of about eight square miles and is favorably situated on sloping land along the river, at an elevation of 230 feet above sea level. The site was once that of the principal village of the Mohawk Indians. The older portions of the town are along the river, and there remain some splendid examples of the architecture of the early Dutch and Colonial periods. Prominent buildings are those of Union College, the Federal building, completed in 1913 at a cost of $270,000; a county courthouse and jail, Carnegie Library, city hall, high school building costing $560,000, Y. M. C. A. and Y. W. C. A. buildings, Van Curler Opera House, and Ellis and Mercy hospitals. Among the institutions are a day nursery, Old Ladies' Home, Children's Home and the County Tuberculosis Hospital. The place where a great Indian massacre occurred in 1690 is marked by an Indian monument. Central Park (124 acres) and Crescent and River Front parks are the principal areas of the city's park system.

The industries of Schenectady, largely developed since 1880, have, according to local estimate, an annual productive value of $60,000,000. Here are located two extensive plants: the General Electrical Company, employing over 20,000 men in the manufacture of electrical apparatus of every kind; and the American Locomotive Works. Among other industrial establishments are foundries and machine shops, and manufactories of clothing, mica insulators, display frames, patent medicines, knives, brooms and brushes.

In 1662 Schenectady was settled, on land purchased from the Mohawks, by a party of well-to-do settlers under the leadership of Arendt van Curler. The settlement prospered, but in 1690 suffered a terrible French and Indian massacre, when sixty of its 250 inhabitants were murdered and more than that number carried into captivity. Another massacre occurred in 1748. The place was again rebuilt and became an important depot of the Mohawk River boat trade. Chartered as a borough in 1765, Schenectady became a city in 1798. The city was partially destroyed by fire in 1819. H.W.R.

Consult Powell's *Historic Towns in the Middle States;* Roberts' *Old Schenectady.*

SCHILLER, *shil' er,* JOHANN CHRISTOPH FRIEDRICH VON (1759-1805), a German poet, born at Marbach, Württemberg. He was educated at the Karls-Schule at Stuttgart, where for a time he studied law and later took up medicine. There, when only seventeen years old, he began to write his romance, *The Robbers,* a play that awakened great interest in Germany when published in 1780. At twenty-one years of age he had written a treatise *On the Connection of the Animal and Intellectual Nature of Man,* which was published in impor-

tant Berlin journals and discussed by the leading European scientists of the day.

When in 1782 *The Robbers* was performed at Mannheim, Germany, Schiller, then an army surgeon, secretly left his regiment to see it, and was arrested by the military authorities. He soon escaped from prison and in a remote village wrote two other plays, *The Conspiracy of Fiesco* and *Cabal and Love*. Afterwards he ventured to return to Mannheim, where, unmolested, he became poet to the local theater, and composed some romantic verses that were widely copied. He then conceived the principal ideas for the plot of his famous drama *Don Carlos*, and went to Dresden to prepare himself for the task by close historical study of the United Netherlands. The play was presented at Leipzig in 1789 and gained him national fame. This success won for him the friendship of some of the greatest writers of Europe, among them Goethe, who procured for him the professorship of philosophy at the University of Jena. He lectured more often, however, on history than on philosophy, and nearly all his writings during the next six years dealt with historical themes. It seemed for a time that the poet was lost in the scholar, but the literary influence of Goethe gradually prevailed, and after 1795 he produced some of the most spirited ballads and songs in any language.

SCHILLER

In 1799 he again wrote a masterpiece for the stage in his *Wallenstein*, and during the next two years composed the famous tragedies, *Maria Stuart*, dealing with Mary, Queen of Scots, and *The Maid of Orleans*, telling the story of Joan of Arc. In 1803 he reached the climax of his power as a writer of dramas in his powerful *William Tell*, a piece of work that has seldom been surpassed in dramatic literature. His last days were spent at Weimar, Germany, where he died May 9, 1805. Schiller's only superior in German literature is Goethe, and it is doubtful whether even the latter surpassed him in vigor and ability to create stirring situations on the stage. His dramas are among the great classics. R.D.M.

Consult Carus's *Friedrich Schiller: Sketch of His Life and Appreciation of His Poetry;* Nevinson's *Life of Schiller.*

SCHILLING, *shil'ing,* JOHANN (1828-1910), a German sculptor whose greatest masterpiece is a colossal national monument commemorating the Franco-German War. This great work is on the Niederwald, a mountain opposite Bingen on the Rhine. Among Schilling's other important works are the *Four Seasons,* at Dresden, a statue of Schiller, at Vienna, the *War Memorial,* a soldiers' monument, at Hamburg, and monuments to Emperor William I and Bismarck, at Wiesbaden. Schilling was born at Mittweida, in Saxony, and received his art education in Berlin, Dresden and Rome. The models of many of his figures are in the Schilling Museum at Dresden.

SCHLESWIG-HOLSTEIN, *shlayz'viK hohl' stine,* a province in the kingdom of Prussia, occupying the southern portion of the peninsula which separates the Baltic and the North seas. It has an area of 7,340 square miles, a little less than that of Massachusetts. Originally the province consisted of two Danish duchies, Schleswig in the north and Holstein in the south (separated by the River Eider), and the Danish language still predominates in the northern sections. In 1910 the population of the province was 1,621,004; the majority of the inhabitants are Protestants. Kiel and Altona are the largest cities; Schleswig, with a population of about 20,000, is the capital. The country is for the most part a level plain, with great tracts of moorland in the interior. On the eastern coast there are several good harbors, for the shore line is indented by many narrow inlets, or fiords. On the western coast,

LOCATION MAP

Schleswig-Holstein, like a wedge, is crowded between the North and Baltic seas.

which is all lowland, dikes have been built to shut off the sea. Chief among the rivers is the Elbe, which bounds the province on the south.

The people are engaged chiefly in farming, the important crops being wheat, rye, oats, barley, hay and vegetables. Horses and cattle are raised in great numbers; the cattle of Schleswig-Holstein have a world-wide reputation. Commercially the province is one of the most important in Germany. It is crossed by the famous Kaiser Wilhelm Canal, and the port of Kiel is the foremost naval station of the empire. Kiel, Altona and Flensburg are all important shipping centers.

Schleswig and Holstein were wrested from Christian IX of Denmark in 1864, by Austria and Prussia, and the two duchies became a part of Prussia in 1866 at the close of the Seven Weeks' War.

Consult Von Sybel's (English translation) *Foundations of the German Empire.*

Related Subjects. The reader who is interested in Schleswig-Holstein is referred to the following articles in these volumes:

Altona	Germany, subtitle *History*
Bismarck-Schönhausen, Prince	Jutland
Denmark, subhead *History*	Kaiser Wilhelm Canal
	Kiel
	Seven Weeks' War

SCHLEY, *sli,* WINFIELD SCOTT (1839-1911), an American naval officer, commander of the expedition which rescued the Arctic explorer Greely, and senior officer in command at the Battle of Santiago, was born in Frederick County, Md. He entered the Naval Academy in 1856, and was graduated four years later. During the years 1860-1861 he was on duty in China and Japan, and the next year, with the rank of lieutenant, took part in the Mississippi River campaign under Farragut, his first service in the War of Secession. Schley was executive officer on the gunboat *Wateree,* and was advanced to the rank of lieutenant-commander in 1866. He then filled a position as instructor in the Naval Academy for three years. The rank of commander was given him in 1874.

WINFIELD SCOTT SCHLEY

When the third expedition for the rescue of the Arctic explorer, Greely, was sent out in 1884, Schley was given charge of it, and after cruising through 1,400 miles of ice, effected Greely's rescue; in recognition of this service he received a gold medal. In 1886 he published a book entitled *The Rescue of Greely,* and two years later was advanced to the rank of captain. While in command of the *Baltimore* at Valparaiso (1889-1892) several members of his crew were killed by natives. Schley negotiated the difficulty, obtaining an apology and an indemnity of $75,000 from the Chilean government. Later he was selected to convey the body of John Ericsson, inventor of the *Monitor,* to Sweden, and while there was presented with a gold medal by the king. In 1898, Schley, then a commodore, was selected to take charge of the flying squadron in the Spanish-American War. During the temporary absence of Rear-admiral Sampson, Schley on the *Brooklyn* directed the Battle of Santiago, destroying the entire Spanish fleet, for which he was promoted to the rank of rear-admiral. In the controversy which followed this engagement he was declared by some to have been the real victor, but by others was charged with "irregularities," and at his request a court of inquiry was appointed. The report, though not wholly favorable to him, recommended that no action be taken.

Schley was one of the commissioners selected to direct the evacuation of Porto Rico; in 1899 the command of the South Atlantic squadron was given him; but in 1901, in his sixty-second year he withdrew from active service. See SPANISH-AMERICAN WAR. M.R.T.

SCHLIEMANN, *shle'mahn,* HEINRICH (1822-1890), a German archaeologist who made valuable contributions to the world's knowledge of early Grecian civilization. When very young he shipped as a cabin-boy on board a boat bound for Venezuela. The ship was wrecked, but Schliemann was rescued and taken to Amsterdam, where he busied himself in acquiring a knowledge of the principal European languages. He amassed a fortune as a tradesman and retired from business in 1864 in order to devote his entire time to archaeological investigations in the East. In 1870 he began the work of excavating the ruins which he believed to be the site of ancient Troy, and he continued this work, with interruptions, until the year of his death. The Greek courts compelled him to pay $10,000 for the collections he had gathered. These he presented to the Folk-

lore Museum at Berlin. He also began excavations in 1876 on the site of ancient Mycenae in Greece, and in 1877 he unearthed the five tombs which, in the days of Pausanias, were believed to be those of Agamemnon and his companions. His published volumes include *Ithaca, the Peloponnesus and Troy; Trojan Antiquities,* and *Mycenae.*

SCHMALKALDIC, *shmahl kal'dik,* **LEAGUE,** a defensive alliance formed at Schmalkalden, Prussia, in 1531, for the support of religious and political freedom of Protestants, and in opposition to Emperor Charles V and the Roman Catholic states. The League, which was originally composed of nine Protestant princes and eleven imperial cities, was joined later by five other princes and ten imperial cities. The elector of Saxony and the landgrave of Hesse were elected chiefs of the alliance and were commissioned to manage its affairs. In a war of 1546-1547 the Protestant army was forced to retreat, and the imperial army subdued the northern members of the League and advanced into Franconia. The combined armies of Saxony and Hesse were defeated at Mühlberg, on April 24, 1547. Maurice, now elector of Saxony, subsequently accomplished the object of the League. By brilliant diplomacy and generalship he compelled the emperor to grant the Treaty of Passau in 1552, which secured the religious freedom of the Protestants. See REFORMATION, THE.

SCHNORR VON CAROLSFELD, *shnohr fon kah'rohls felt,* JULIUS (1794-1872), one of a group of German painters who at the beginning of the nineteenth century endeavored to revive the Christian spirit of early religious art. They, like the English Pre-Raphaelite school (see PRE-RAPHAELITES), turned to the early religious painters of Italy for inspiration and guidance. Schnorr was born at Leipsig. For a while he studied at Vienna, but later went to Rome, where the other German painters interested in this movement had gone previously. Here he distinguished himself by painting a series of frescoes on the walls of the Villa Massimi. In 1827 he was commissioned by King Louis of Bavaria to paint for his new castle at Munich a series of frescoes illustrative of the *Nibelungenlied* and incidents in the lives of Charlemagne, Rudolph of Hapsburg, and Frederick Barbarossa. In 1846 he was appointed professor at the Fine Arts in Dresden and director of the royal picture gallery. While here he designed 180 pictures to illustrate the narratives of the Bible, which many consider his finest work. He also executed notable stained-glass windows for Saint Paul's Cathedral, London, and for Glasgow Cathedral. Among his associates were Cornelius, Veit and Overbeck. See CORNELIUS, PETER VON.

SCHOFIELD, *sko'feeld,* JOHN MCALLISTER (1831-1906), an American soldier who served on the Union side throughout the War of Secession. Between 1888 and 1895 he was the commanding general of the United States army. He was born in Chautauqua County, New York, and was graduated at West Point in 1853. At the outbreak of the War of Secession he became major of the First Missouri Volunteers, and commanded in turn the District of Saint Louis, the Army of the Frontier and the Army of the Ohio. In 1862 he was promoted to the rank of major-general of volunteers. During Sherman's Georgia campaign and in the Battle of Franklin he rendered distinguished service and was brevetted major-general in the regular army in recognition of his bravery. Subsequently he was sent to North Carolina, where he captured Wilmington and was otherwise active until the surrender of Johnston. He continued in the army after the war, and in 1868 was made Secretary of War, to succeed Edward M. Stanton. In 1895 he retired with the rank of lieutenant-general. His chief published work, *Forty-Six Years in the Army,* appeared in 1897.

SCHOLASTICISM, *sko las' ti siz'm,* the philosophy of the schools of the Middle Ages. It represented an attempt to fuse the beliefs of the Church with the logic of Aristotle, just restored to Europe by the Saracens. The greatest teachers of the scholastic method were those of the thirteenth century, among them being Albertus Magnus, Roger Bacon, Duns Scotus, and Thomas Aquinas. The latter was known as the "Angel of the Schools" and outlined the whole scheme of Roman Catholic theology in his great work, *Summa Theologia.* Though the later scholastics busied themselves with many unprofitable speculations—such as "How many angels can be supported on the point of a needle?"—the whole movement was valuable in awakening the mental life of Europe from the lethargy of previous centuries, and in preparing the way for the revival of classical learning known as the Renaissance.

Related Subjects. The following articles in these volumes will make clear the references in the above discussion of scholasticism:

Aquinas, Saint Thomas	Duns Scotus, Joannes
Aristotle	Renaissance
Bacon, Roger	Saracens

SCHOOL. An Englishman, on a certain occasion, was showing a friend the evidences of modern enterprise in his town. In passing an imposing structure the stranger remarked that for a factory building it was the finest example he had seen. He asked, "What do they manufacture there?" The answer came at once, "Brains; that's a schoolhouse."

A nation is strong only in the degree in which it recognizes the influence of religion and education; they are the fundamental bases of the state. The masses who compose the state are in accord on this principle. No man, even if he is without religious leanings, cares to establish a home far from any church; neither does he consider property valuable if schools are many miles distant. The one stands for security; the other, for progress. Wherever civilization advances, in the vanguard are found the modest church and the struggling school. When, by chance, these two institutions are late in assembling their forces, there is evidence in plenty of lawlessness and general disorder.

The builders of the American republic, to cite possibly the most conspicuous example, stated the case concretely in the plans they laid for the opening of the great Northwest Territory. The only clause of present-day interest in the Ordinance of 1787 was one which recognized the mighty power that lies in education; it is quoted wherever school bells ring and is printed in countless books, that boys and girls may never forget wherein lies the strength of a free people:

> Religion, morality and knowledge being necessary to good government and the happiness of mankind, schools and the means of education shall forever be encouraged.

The first school for every person is at the mother's knee; "every word spoken by the mother within the hearsay of little children," says Ballou, "tends towards the building of their future careers." The father may strive to do his full duty, but of this first school he is little better than assistant superintendent. The woman endowed with mother love is truly an infant-school specialist, and it is within the mother's power, when eventually the state claims a part in the schooling of her children at the age of seven, to send them to public instructors with ideals firmly fixed and characters deeply rooted.

The state demands that those upon whom its future depends shall go to school; not only are "schools and the means of education" encouraged, but they are made compulsory. When the American Declaration of Independence was published to the world only twelve out of every hundred people in the thirteen new democracies it created were able to write. Small wonder that when one delegate in the Constitutional Convention later pleaded for the people's participation in the government Alexander Hamilton should have said, "The people, Sir; the people is a great beast!" Uncouth, uneducated, untaught in the fine art of clear thinking, the masses were not fit to be intrusted with power. The educated minority set about to remedy the defect which would have made a successful government by the people impossible. "Schools and the means of education" have multiplied until an illiteracy of nearly ninety per cent has been reduced in less than 150 years to an average of five per cent for white people in the whole nation, while in Iowa, Nebraska and Oregon less than two per cent are unable to write.

A COLONIAL SCHOOL

Nearly all schools 150 years ago were under Church control, and a good deal of attention was given to religious instruction. The first school readers were filled with admonitions against frivolity and with warnings of the future state of the wicked. The United States blazed the way for the world in declaring in its new Constitution in 1787 that "no law respecting the establishment of religion or prohibiting the free exercise thereof" should be passed. It has become the sole business of public school systems to train boys and girls in mathematics and the sciences, in literature, in music and in those vocational and domestic arts which prepare them for lives of economic independence and usefulness to their communities and to the state.

Schools have become specialized and systems have been unified until now boys and girls find a straight educational pathway leading from the kindergarten to the state university, with tuition free all along the way. Any boy or girl, given good health and determination, without regard to wealth, may pass through these schools, step by step, quitting the highest institution at last with an endowment of knowledge infinitely beyond the wildest dreams of mankind a hundred years ago.

In the following articles various phases of school systems are discussed. The schools of Canada are described in the articles on the various provinces under the subhead *Education,* and in the article CANADA, subtitle *Education.* Educational conditions in each of the European countries are described under the subhead *Education* in the respective articles dealing with those countries. E.D.F.

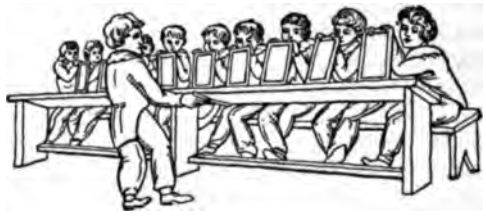
Consult Dewey's *Schools of To-Morrow.*

Public Schools

Public schools include all schools that are supported by public funds. In the United States they are classified as common, or elementary, schools, high schools, evening schools, vacation schools, etc. All public schools are conducted according to the law of the state in which they are located; they are therefore under state control. The first settlers in America, whatever their nationality, recognized the importance of education, and public schools were among the first institutions founded by them. These schools are a monument to the wisdom of the forefathers, for through them they made education the chief corner stone of the foundation upon which American institutions were to be reared. Says E. E. White:

> With matchless wisdom they joined liberty and learning in a perpetual and holy alliance, binding the latter to bless every child with instruction which the former invests with the rights and duties of citizenship. They made education and sovereignty coextensive by making both universal.

Common Schools. Common schools are those which give instruction in the common branches and whose work extends from the first grade to the eighth grade, inclusive. While early attempts to provide elementary education were made in Virginia, and by the Dutch in New Amsterdam (New York), it is to Massachusetts that we must look for the beginning of the American common school and the American system of public education. In 1635 the people of Boston assembled in town meeting, requested Philemon Purmont to become schoolmaster and voted him thirty acres of land in part pay for his services. The school begun by Mr. Purmont later became the Boston Latin School, and has had continuous existence to the present time. Other settlements followed Boston's example, and within the next ten years common schools were established in all the New England settlements. In 1647 the General Court of Massachusetts ordered every



IN NEW ENGLAND

Monitor examining slates in a school in colonial days.

town having fifty families to appoint a teacher, whose wages were to be paid by the parents of the children he taught or by the inhabitants in general. At the same time townships having one hundred families were required to establish a grammar school to fit youth for college. The law establishing these two grades of schools laid the foundation of the public school system in the United States. Three years later a similar law was passed in Connecticut, but Rhode Island made no attempt to form a school system until 1790.

The Dutch established a system of public schools before New Netherlands was taken by

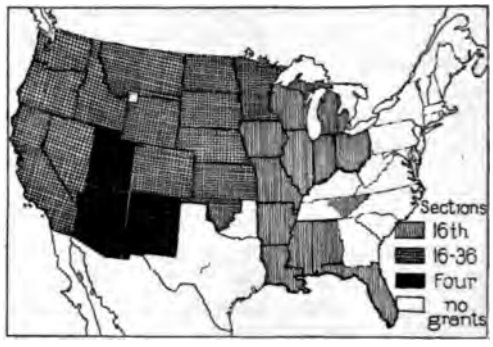
the English. After this event but little attention was given to public education until after the Revolutionary War. Schools were founded by the Swedes in New Jersey and Delaware, and the charter granted William Penn provided for a system of education. This, however, was not carried out until long after Penn's death. The large plantations in the Southern colonies made the establishing of public schools impracticable. Children of the planters were taught in their homes by tutors or governesses. Boys of wealthy families were usually sent to England to complete their education. This system was perpetuated, and but few public schools were organized in the Southern States until after the War of Secession.

During the colonial period private schools, taught by women as a means of support, were to be found in the New England and other colonies. To these the name of *dame schools* or *kitchen schools* was often applied. No women were employed as teachers in the public schools. Occasionally girls were admitted to the dame schools, but no provision for their education was made in the public schools.

Support. Previous to the Revolutionary War the support of the public schools was partly by taxation and partly by rates paid by the parents whose children received instruction, and the plan was continued for a long time after the war. In all colonies the public schools were considered charity institutions, but in Massachusetts this view was not general. This plan of support had a tendency to create class distinctions, and it nearly defeated the purpose for which the schools were organized. Those unable to pay the rates regarded the public provision for educating their children as an evidence of their poverty. The wealthy shunned the schools because they considered them degrading.

The resources of the country were so strained by the Revolutionary War that, for a time, taxation for the support of schools was light, but as the states regained their prosperity public education began to receive better support. The first great impetus given to public education by the national government is found in the Ordinance of 1787 (which see). This consisted in setting aside the sixteenth section of land in every township for the support of public schools. By this provision twenty-eight states were able to accumulate a school fund which, while lightening the burden of taxation, enabled them to develop a highly efficient system of schools. In 1848, when the survey of the Oregon country was ordered, Congress ordered that the sixteenth and thirty-sixth sections in every township be reserved for the support of schools. All states admitted since 1850 have been granted two sections except West Virginia, which was formed from Virginia. Arizona, New Mexico and Utah were granted four sections to the township.

The total area of the grants for common schools is about 81,064,000 acres, which equals the combined areas of the states of Ohio, Indiana and Illinois; the value of this land at the government price of $1.25 per acre would



LAND GRANTS FOR COMMON SCHOOLS

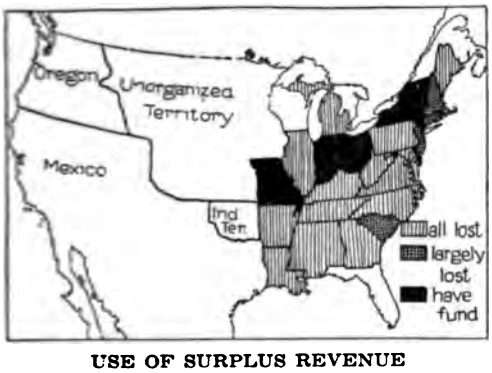
be about $100,000,000. The actual value is, however, much greater, for in those states in which school lands are sold prices ranging from $5 to $25 an acre are received. In states where the lands are leased, the rental is based upon a still higher valuation. To this fund all states admitted to the Union since 1860 have added five per cent of the net receipts from the sale of all public lands within their respective borders.

The original states and Kentucky had no public lands, and these states petitioned Congress for grants from the national domain. The petitions were denied on the ground that such grants would be an obstacle to the settlement of the territory in which they were located. In lieu of grants of public land in Jackson's administration the surplus revenue in the United States treasury, amounting to about $28,000,000, was distributed among the states, each state receiving such a proportion of the entire amount as its population bore to the population of the United States. Some of these states reserved their portion for the support of common schools.

The funds thus provided must necessarily be increased by state and local taxation. The general school fund, that derived from sources described above and from a state tax, is appor-

tioned to the schools according to the laws of the respective states. In some states the distribution is based upon school attendance; in others upon the school population of the school unit, as a county, city or school district.

School Systems. The question "Has the United States a national school system?" is often asked. There is no legally recognized national system of schools. The organization and management of its schools are left to each state, but these forty-eight independent organizations so closely resemble one another in their scope, courses of study and plans of administration that it may be said that the United States has a greater unity and similarity in courses of study and methods of administration than exist in any other country in the world, with the exception perhaps of France. It is, therefore, not incorrect to speak of an American system of education. The chief agencies in securing this unity are the United States Bureau of Education and the National Education Association. The *Reports* and the many other printed documents of the Commissioner of Education have kept the leading school officials and educators informed upon the work



USE OF SURPLUS REVENUE

What became of the $28,000,000 surplus revenue which was distributed among the states for school purposes in 1836-1837.

done in all parts of the country, and at the meetings of the National Education Association methods of instruction and administration and courses of study are discussed and criticized by educators representing every state. The Department of Superintendence has been especially influential in unifying courses of study and methods of administration.

Administration. We have seen that the first schools were established by communities, each community becoming responsible for the support of its own school. This plan was the beginning of the district system of management still found in many states. Settlers move westward along parallels of latitude, and each state organized a school system similar to that of the state or states from which a majority of its inhabitants came. In this way the New England method of administration was extended to all of the states north of the Ohio River. Later, in New England, the town replaced the district as the unit of administration. In all the states west of New England the county is the unit for supervision and for certifying teachers, except in a few localities where the state issues the certificates. In the Southern states the county is the unit of administration. Each state maintains a department of public instruction whose executive officer bears the title of superintendent of public instruction, as in Minnesota, or commissioner of education, as in Massachusetts. In case the department consists of a state board of education, the executive officer may be styled secretary. In some states much of the work of the department of public instruction is largely advisory; in others it is of an executive nature. Incorporated cities are units of administration and their schools are directed by a superintendent or a supervisory principal, who is responsible to the city board of education. The schools of rural districts are in charge of local boards who engage the teacher, provide the necessary school material and have oversight of the school property.

City schools are thoroughly graded and every large city has its own course of study. In all states uniform courses of study for the rural schools have been adopted, and manuals of directions for their use placed in the hands of the teachers. This enables pupils in these schools to make systematic progress through the eight grades of elementary instruction.

Standardization. In all states in which high schools receive state aid, they are required to reach a standard fixed by the state university or the department of public instruction. This plan was so successful in bringing these schools to a higher standard that in several states a similar plan has been adopted for the one-room rural schools. The department of public instruction fixes requirements relating to the grounds, school building, furniture, library, course of study, qualifications and salary of the teacher, and standards of teaching and maintaining discipline. One or more rural school visitors are appointed by the department, who visit those schools of each county which the county superintendent thinks may meet the requirements. In Illinois, if the school has

reached the required standard, a plate marked *Standard School,* with the number of the district, is placed over the door of the schoolhouse. A still higher grade of school in this state is designated as a *Superior School.* In all states where the plan has been adopted it has awakened new interest in education on the part of rural communities.

Consult Betts and Hall's *Better Rural Schools;* Smith's *All the Children of All the People;* Bureau of Education Circular, *Minimum Health Requirements for Rural Schools.*

High Schools. The first high school in the United States was the Boston English School, established in 1821. Since the middle of the nineteenth century high schools have become a part of the school systems of all cities and states. The city high school is a part of the city system and is supported by the regular public school fund. In some states the laws permit the organization of township high schools, making the township the unit for taxation and management. Illinois and Indiana have a large number of township high schools, thus bringing these schools to rural communities. In some states state aid is granted high schools which reach a required standard. In such cases they are usually affiliated with the state university.

For a long time the chief work of the high school consisted in preparing its students for college, but in recent years the work has been broadened and the courses of study have been radically changed to meet modern requirements. While college preparatory courses are still maintained, other courses designed to prepare students for entering upon their chosen vocation have been added. Many high schools now have courses in shorthand, bookkeeping, domestic science and manual training. In many schools courses in elementary agriculture have been introduced, and agricultural high schools are becoming common in the most progressive agricultural states (see AGRICULTURE, subtitle *Agricultural Education*).

Technical high schools are found in large cities. These schools aim to prepare students for various lines of industry, and they are usually equipped with workshops, laboratories and with kitchens for advanced work in domestic science. The consolidation of rural schools has led to the establishing of numerous rural high schools in which the courses of study are adapted to the needs of the students in these communities (see subhead below, *Consolidated Schools*). Some high schools maintain two-year courses for those students who are unable to remain in school to complete the four-year courses. This plan influences many young people to enter the high school who would otherwise leave school on completing the work of the eighth grade.

In many states the supervision of high schools is twofold. These institutions are under the direct supervision of the principal or city superintendent, as the case may be, and under the indirect supervision of the state university, which sends a high-school inspector to visit the schools and report their condition and progress. Graduates of schools which maintain the required standard are placed on the accredited list, and their graduates are admitted without examination to any college or university accepting this standard.

Reports of the Commissioner of Education show that about twenty-five pupils out of every hundred that enrol in the common schools enter high school, and that about fourteen out of every hundred who enter high school complete a four-year term. Only one pupil out of 120 goes to college.

Evening Schools. Evening schools have formed a part of the educational system of the leading countries of Europe for more than a century, but the free public evening school in the United States has been developed since 1850, although several beginnings were made previous to that date. The purpose of these schools is to enable those who are employed during the day to extend their education. Evening schools now form a part of the public school system of every large city, and they are exerting a strong influence in favor of better education of the men and women who are wage earners. The pupils may be roughly divided into three classes—boys and girls who were compelled to leave school before they had completed the elementary course of study, men and women who wish to fit themselves for higher positions, and those who wish to complete some branch of higher education. In general, the pupils are older and more mature than those of the day school. They desire strong, practical work, and the methods employed must necessarily be different from those in the day school. One of the most important lines of work consists in teaching English to foreigners. Evening classes in the technical high schools pursue industrial or commercial subjects. The public evening schools in the United States employ about 15,000 teachers and have an enrolment of about 700,000 pupils.

Besides the public schools, many private institutions maintain evening classes. Some of the most noted of these are the Cooper Union, New York; the Drexel Institute, Philadelphia; the Art Institute, Chicago, and the Young Men's Christian Association classes in all large cities.

Consolidated Schools. The one-room rural school is at a great disadvantage when compared with the graded schools of cities or villages. This disadvantage is so apparent to many families in rural communities that not a few send their children to the nearest graded school. Moreover, one of the chief causes for the movement of the inhabitants of rural communities to the city is a desire to secure better educational advantages for their children. The consolidated school has been established to overcome these disadvantages and to meet the demand of rural communities for better educational facilities. The first consolidated school was established in Concord, Mass., in 1869. At first it included the schools of only two of the old districts, but within ten years every district in the town had been abolished by vote, and the school represented the entire town. Since 1900 the movement for consolidation has grown rapidly, and the consolidated school is now found in nearly every state of the Union.

Consolidation is brought about when adjoining districts vote to unite into one district in accordance with the law providing for such union. The law providing for consolidation also provides for carrying pupils to and from school and for paying for the transportation out of the school fund. In most states the law is permissory, that is, it allows consolidation; in a few it is in a measure compulsory by requiring the closing of all schools whose average attendance falls below a certain number. In Indiana this number is twelve.

The chief advantages of the consolidated school are: Better teachers and more extended courses of study; better school equipment; opportunity for grading the pupils; larger classes; the enthusiasm that comes from numbers; better supervision; more regular attendance; opportunity to teach effectively such subjects as agriculture, domestic science and manual training and so interesting the pupils that they will remain in school a longer time; and, in some instances, an equalization of taxes for school purposes.

Consult Kern's *Among Country Schools*, 1906; Betts and Hall's *Better Rural Schools*, 1914.

Vacation Schools. Vacation schools have been opened in many cities for the purpose of preventing the undesirable effects of the long summer vacation, especially in congested quarters where children have no playgrounds. Some of these schools aim to keep the children off the street and to give them some pleasant and profitable occupation during a part of the day. The girls may be taught sewing or cooking and the boys woodwork or some other occupation. Studies in English may occupy a part of the time. In these schools the playground is an important factor. The other type of school offers regular school work for pupils who have failed of promotion. Both lines of work may be undertaken in the same school. In localities where most of the pupils come from homes of foreigners much attention is given to teaching the children to speak and write English. The length of the term of the vacation school varies from four to eight weeks. One great advantage of these schools lies in the flexibility of the course of study, which enables each school to carry on those lines of work which are best suited to the community that it serves.

Continuation Schools. The increasing demand in the United States for better education on the part of those who are employed during the day has led to the provision of various means through which this demand may in a measure be satisfied. To schools designed for this purpose the name *continuation* has been applied. Continuation schools have existed for centuries in Europe and have reached their highest development in Germany, where attendance upon them is compulsory. Their introduction into the United States is of recent date. Students in continuation schools may pursue lines of work designed to perfect them in some industrial pursuit, or they may pursue studies along the line of general education. While evening schools may be considered as a branch of continuation schools, the most successful work is done where arrangements are made with the employer by which the student is allowed to spend a portion of the day at work and the remainder in school. In some cases the school allows the student credits for this outside work. See subhead *School Credits for Home Work*.

Vocational Schools. Statistics show that eighty-five per cent of the pupils trained in the public schools must earn their living through industrial processes. Vocational schools are schools whose chief purpose is to fit young people for useful occupations. In the broadest

sense they would include all schools devoted to preparation for the professions and for any line of industry, but in its ordinary use the term *vocational* is applied only to those schools engaged in preparing wage earners in industries and in household arts. The term *prevocational* is also applied to these schools. Vocational schools are found in practically every state in the Union. The schools are elementary in character, but do not receive pupils under fourteen years of age. The courses are usually two years in length, but three-year courses are provided in a few of them. In most of the schools the time is about equally divided between book work and practical work. In Cincinnati the public schools are so organized that after pupils have reached the required age they can choose their occupation and divide their time between the school and the establishment where they are employed, and receive credit for this outside work. Many evening schools are largely or wholly vocational, and continuation schools are designed to enable pupils who have left the regular school to go to work to continue their school work or to take up studies directly related to the occupation in which they are engaged.

The practical work for boys usually includes cabinetmaking, carpentry, electrical wiring, forging, founding, pattern making, plumbing, printing and sheet-metal work; for girls the courses include dressmaking, millinery, cookery, housekeeping, art and design and novelty work. The practical work is supplemented by closely related courses in drawing, mathematics and science, and with studies in English, geography, history and civil government. The book work is about the same for boys and girls.

The shop work is usually taught by practical tradesmen, and is made practical and businesslike. In some school systems the pupils do repairing, construction work and printing for the board of education; in other schools orders are taken from outside firms, to which the finished articles are delivered at current prices.

Government Aid. One of the most constructive acts of the Sixty-fourth Congress was the Smith-Hughes law relating to industrial education. The bill provides—

1. Appropriation for coöperating with the state in paying the salaries of teachers, supervisors and directors of agricultural subjects. These appropriations begin with the sum of $500,000 for the fiscal year 1918, and increase at the rate of $250,000 each succeeding year until, in 1926, an annual appropriation of $3,000,000 is reached. The sum allotted each state is in the proportion which its rural population bears to the rural population of the United States, with the provision that prior to 1923 no state shall receive less than $5,000 annually, and no less than $10,000 after that date.

2. Appropriations for the purpose of coöperating with states in paying the salaries of teachers of trade, home economic and industrial subjects. These appropriations are for the same amounts as those for the teachers of agricultural subjects, but they are distributed on a different basis, the sum allotted each state being in the proportion that its urban population bears to the urban population of the United States, with the same provision for minimum allotment as in case of the appropriation for agricultural teaching.

3. Appropriations for coöperating with states in preparing teachers, supervisors and directors of agricultural subjects, and of industrial and home economic subjects. This appropriation begins with $500,000 for 1918 and is increased $200,000 each succeeding year until, in 1921, it reaches $1,000,000, which shall be the annual appropriation thereafter. It is divided among the states in proportion to their population.

The act created a Federal Board of Vocational Education to consist of the Secretary of Agriculture, the Secretary of Commerce, the Secretary of Labor, the Commissioner of Education, and three citizens appointed by the President, one to represent manufacturing and commercial interests, one agricultural interests and one labor interests.

AN OPEN-AIR SCHOOL

The canvas screens at the windows protect the children from direct currents of cold air. (From photograph taken in a Chicago, Ill., school.)

Each state is required to create a state board of not less than three members to coöperate with the Federal Board in the administration of the act, and to provide equipment and establish courses of study that meet the approval of the

Federal Board, in order to receive the benefit of the act.

Open-Air Schools. The purpose of the open-air school is to enable children whose physical condition will not allow them to remain in the ordinary school, to continue their education and at the same time recover their health. The first schools of this sort in the United States were opened in New York City and Providence, R. I., in 1904. They are now found in practically all large cities and in many smaller ones. The schools are of two types, those conducted out-of-doors, as on the roofs of buildings, or on the ground with only a tent or roof of some sort for shelter, and those conducted in rooms with open windows, known as open-window schools. Preference is usually given to the outdoor school. Health inspection of school children in a large number of cities shows that from two to ten per cent of the pupils are physically unfit to be in the public schools. This means that from 400,000 to 2,000,000 children of school age should have special attention

THE SITTING-OUT BAG
Shown closed and open. It provides protection to the feet and lower limbs.

given to their physical welfare. The open-air school can restore most of these to health.

The schools endeavor to care, first, for those children who are undernourished and whose general appearance indicates inability to resist disease. Children suffering from any communicable disease, those whose condition requires absolute rest and hospital treatment, and children suffering from forms of tuberculosis, in which the bacilli are given off through the excretions, are excluded. Children should be admitted only after a thorough physical examination.

Special clothing is necessary. This consists of the sitting-out bag, the sleeping bag and a warm outer garment provided with a hood; in place of the hood a knitted woolen cap may be used. In some schools Eskimo suits, like those shown on page 5242, are used. Special footwear is recommended, but this may not be essential. The classes are smaller than in the ordinary school, and the course of study is

SLEEPING BAG AND COT
Used in Chicago's open-air schools.

more flexible, devoting a larger proportion of the time to industrial work. Since rest is one of the principal needs of the pupils, a portion of each session is reserved for quiet. The pupils lie upon couches in their sleeping bags and are encouraged to sleep.

Nourishing food is another important requisite and this is provided by the school. Usually lunch is served in the middle of the forenoon session, dinner at 12:30 and lunch before the pupils go home in the afternoon. All meals consist of plain, wholesome food, so cooked and served as to make every dish appetizing.

Consult Kingsley's *Open-air Crusaders,* 1910; Watt's *Fresh Air for the Average School Children; The Survey,* March 5, 1910; Ayles' *Open-air Schools,* 1911; *Open-air Education,* Bulletin U. S. Board of Education; Upton's *Open-air Schools,* 1914.

Medical Inspection in Schools. Physical examination of over 252,000 school children in New York City public schools showed that seventy-four per cent of them were defective. Over fifty-three per cent of those examined had defective teeth, over ten per cent had defective vision; fourteen per cent defective nasal breathing, and nearly eighteen per cent had enlarged tonsils. None of these children was able to do his best in school because of his physical condition. It would seem that no further argument should be necessary to convince any community or board of education of the necessity of medical inspection of school children.

In the United States medical inspection of school children was begun in Boston in 1894 because of epidemics among the pupils in its

public schools. In 1895 Chicago adopted a similar system, and New York and Philadelphia followed in 1897 and in 1898. Outside these cities the plan received little attention previous to 1907. Since that date medical inspection has been introduced into practically all large cities and many small ones in the United States and Canada. The chief purpose has always been to prevent the spread of contagious diseases, but two other lines of work are carried on. These are the inspection of pupils by teachers to detect defective vision and defective hearing, and a thorough physical examination by a competent physician. This looks to the child's future as well as to his present welfare. It is much less common than the other lines of work.

Medical inspection has made the school nurse a necessity, and in large cities nurses are employed. Their chief duties consist in following up the doctor's recommendations, treating children suffering from colds and other minor troubles so that they may remain in school, watching for children who may need the doctor's attention, and visiting the homes of pupils who are absent because of illness. This last duty often makes the nurse the connecting link between the home and the school.

The support of medical inspection in the United States is inadequate, and the best results have not as yet been secured. In some cities the work is in charge of the board of health and the inspection is by physicians connected with this board. In many of the smaller cities physicians donated their services when the work was introduced, and in nearly all cities the remuneration is so small that experienced physicians cannot be secured. Nurses are paid from $700 to $800 a year, but the pay of physicians is so varied that no average of the compensation can be given.

Consult L. H. Gulick's *Medical Inspection in Schools,* 1908; Russell Sage Foundation, *What American Cities Are Doing for the Health of School Children* and *Medical Inspection Legislation.*

School All the Year Round. The annual reports of the United States Commissioner of Education show that the average number of days in which the public schools of the entire country are in session is a little over 158, or about one-half the number of working days of the year. In some states the average is a little over 198 days; but in others it is less than 100. Moreover, because of irregular attendance, many pupils lose nearly one-half the time in which the school is in session, and the same reports show that the average number of days which children from five to seventeen years of age inclusive spend in school each year is a little over eighty-four. These figures show an educational waste which should be conserved.

All educators agree that in cities the pupils lose during the long summer vacation the habits of industry gained during the school year; that what they learned has not been put into practice, and that too often vicious habits are formed, so that it requires at least a month of the next school year to bring the pupils back to the condition they were in when the school closed. The school authorities of a few cities have tried to remedy these conditions by having school twelve months in the year. The most noted example of this experiment is seen at Gary, Ind. (see GARY SCHOOL SYSTEM). Newark, N. J., and Eveleth, Minn., have also adopted the plan of the all-the-year-round school with marked success, and with satisfaction to both pupils and patrons. The vacation schools in large cities are instituted to overcome the disadvantages of the long summer vacation, but there are only a few of these schools in each city and they are in session only four or six weeks. While these schools are a step in the right direction, they do not solve the problem.

Plan. The school year is divided into four terms of twelve weeks each. One-third of the work of the year may be done in one term, and children are required to attend at least three terms a year. When a child is enroled for the summer term he is expected to attend regularly. The work of the summer term is the same as that of other terms, except that more attention is given to recreation.

Advantages. First, those pupils who have to leave school to go to work as soon as the law will allow gain time in school and can carry their education much further than by the old plan. Between his tenth and the end of his fourteenth year a child may by this plan gain a full school year. This gain is equally valuable whether he goes to work or attends high school. Secondly, the loss occasioned by the long vacation is prevented. Thirdly, many families living in cities which have cold winters desire to escape the severe winter by going to a warmer climate. This they cannot do without taking the children out of school. If they know that the children can take their vacation in winter and do their school work in summer, a serious

obstacle to effecting a change of climate is removed. Fourthly, the school plant is in use throughout the year.

Objections. The great objection raised to school all the year round is that of increased expense, but the experiments that have been tried show that this objection is not valid. The increase in expense is entirely out of proportion to the value of the advantages derived from the plan. The second objection is that pupils and teachers cannot withstand the nervous strain, but the plan allows any pupil to remain out of school one term in the year, and whenever any teacher desires a leave of absence for a term the matter can be easily arranged. The third objection is that the help of the older children is needed at home during the summer. This objection is valid in many rural districts, but the necessity for a summer term in these districts is not so great as in the cities, because in the country the children live an outdoor life and learn much from their contact with nature.

Tendencies. The University of Chicago, since its organization, has been open the year round. Other universities and colleges are following its example in increasing numbers and holding summer terms. In several states the state normal schools are required to hold summer terms. The example set by these institutions has led a few cities to adopt an all-year-round plan. While this new plan may gain ground slowly at first, its advantages are so evident that in time it will probably be adopted by most American cities.

School Credits for Home Work. Many cities are unable to maintain classes in manual training, domestic economy or other lines of vocational training, and industrial conditions are such that the pupils receive little or no practical training in the affairs of life. To overcome this difficulty educators have in some cities and counties arranged a system of credits for work done at home or in other places besides the school. Boys may work in shops, stores or business offices. Pupils may take music lessons, instrumental or vocal, and some schools allow credits for work done in literary societies held outside of the schoolhouses. In some rural communities boys are given credit for various lines of farm work, and girls for canning, cooking, sewing and housekeeping, though both may receive credits for work in which boys and girls can engage, such as gardening and raising poultry. In cities credits are usually given to high school pupils only. In case a pupil desires credit for work in music the lessons must be given by a teacher approved by the superintendent or the principal of the high school, and a stated amount of time must be given to practice daily. In some instances home work is supervised by the teachers; in others the parents certify to it. In all cases a stated amount of work is required. The credits vary under different systems, but they seldom exceed one credit for work done at home to fifteen for school work.

Wherever the plan has been tried it has met with favor, since it enables pupils to acquire practical experience or to take studies not provided in the regular courses without overworking or extending their time in school, and it increases the interest of the home in the work of the school. W.F.R.

Special Schools

Schools for Teachers. Every state system of education and a number of city systems include schools for training teachers. These schools are known as state normal schools, city training schools and schools of education, or teachers' colleges.

Normal Schools. The first public normal school in America was opened at Lexington, Mass., in 1839, and another was opened at Barre, Mass., the same year. From this beginning the normal school idea spread from state to state, until now every state maintains one or more of these schools, and one is maintained by the Federal government in the Philippine Islands. State normal schools are supported by appropriations made by the state legislature. Most of them offer courses of study requiring four years for those students to complete who have not been graduated from a high school, and requiring two years for high school graduates. In the elementary courses the common branches are reviewed from the viewpoint of the teacher. The physical sciences with special reference to nature study, history, civil government, geography and literature are required, and the elements of psychology and pedagogy are taught.

Every thoroughly equipped normal school has a training school including all the grades found in the public schools. Practice teaching in this school is an important part of the course, and the student must show herself to be a suc-

cessful teacher before she can receive the diploma of the school. Some normal schools make arrangements whereby the practice work is done in the city schools and in near-by rural schools. This is the better plan, since it brings the practice teacher in contact with the actual conditions which she must meet after graduation. All practice teaching is done under the supervision of the normal school. In advanced courses more professional work is done, including more advanced work in psychology and pedagogy, child study and the history of education. Courses vary in different states and in different schools in the same state, since each school must adapt its work to the needs of the locality to which it ministers. The chief work of normal schools consists in training teachers for graded and rural schools.

City Training Schools. City training schools are maintained in some large cities for the purpose of training teachers for the schools of the city. They are supported from the city educational fund and are usually under the same management as the public schools. City training schools differ from state normal schools, chiefly in adapting their work to the city course of study. Graduates of the city high schools are usually admitted to the city training school without examination, and a diploma of the training school is equivalent to a certificate of the city superintendent.

Teachers' Institutes. In many states teachers' institutes are held in each county yearly. The time chosen is usually during the summer months when schools are not in session. The average time of the institute is one week. The institute is usually under the management of the county superintendent of schools, and the instructors are educators of extended experience. Methods of teaching the common branches are illustrated and lectures on educational subjects are given. The institute serves as a stimulus to the teachers and gives them many practical suggestions.

Teachers' Colleges, or *Schools of Education,* are schools of pedagogy of collegiate grade. They engage in research work in education, and their courses of study are designed to prepare students to teach in normal schools, to become superintendents of schools, or to take professional positions in other schools of education. Most of these schools are departments of or affiliated with universities. Most of the state universities maintaining schools of education, Harvard University and the University of Chicago, have excellent schools of this kind, and the Teachers' College affiliated with Columbia University has become widely known. Practically all universities maintaining schools of education hold summer terms for the benefit of teachers of elementary and high schools. The work done during these sessions is similar to that of the state normal schools, but those attending have at their disposal all the advantages in the way of equipment and library facilities which a great university can offer.

Government Schools. The public schools of Alaska, the Canal Zone, Guam, Hawaii, the Philippine Islands and Porto Rico are under the administration of the Federal government, being in charge of the Bureau of Education. The chief educational officer, usually styled *director* or *superintendent of education,* is appointed by the President and confirmed by the Senate, but the direction of the educational work is left to the Bureau of Education. From the academic viewpoint the chief work of these schools is to teach the natives to speak and write the English language. In addition, the same branches are taught that are found in the elementary schools in the United States, but a larger proportion of the time is allotted to industrial work. However, the work of the teachers and supervisors does not stop here. They are expected to do whatever they can to elevate the standard of living, secure the introduction of sanitary measures and to protect the natives from unscrupulous traders who try to purchase whatever they have to sell much below the market price.

A good illustration is seen in the work of the Bureau of Education in Alaska. Every teacher is a social worker, and, in addition to performing the routine work of the school, strives in every way possible to promote the physical, moral and industrial welfare of the natives, adults as well as children. Under direction of the teachers and nurses the natives are encouraged to build sanitary homes. In some places they are taught to raise vegetables. A number of coöperative stores have been established through the encouragement of the Bureau of Education, and these are under the supervision of teachers. The reindeer service, introduced into the territory by the Bureau in 1892, is still under its supervision and is proving to be one of the most beneficial measures thus far undertaken for the benefit of the Eskimos. All medical work, including the furnishing of supplies, is also in charge of the Bureau.

In all outlying possessions the government schools have exerted a strong influence over the

native people in elevating their standard of living, strengthening their moral character and preparing them for citizenship.

Government schools for Indians are in charge of the Commissioner of Indian Affairs (see INDIANS, AMERICAN, subhead *Education*). The schools of Washington, D. C., are controlled by a local board of education. One-half the expense of their maintenance is appropriated by Congress and one-half is provided by the city.

Parochial Schools. Parochial schools are established and maintained by religious denominations. Broadly the term would include church educational institutions of all grades, but as it is ordinarily used it applies to elementary schools only. Nearly all denominations maintain parochial schools for one cause or another. In all, the doctrines of the Church by which the school is maintained are taught. The course of study and methods of instruction conform to those of the public schools of the city or state in which the school is located. In some of these schools girls are taught sewing and cooking, and boys are given work in manual training. The Roman Catholic, Episcopal and Lutheran churches maintain high schools in some localities, and practically all denominations have mission schools for the education of Indian and negro youth. Parochial schools are supported by their respective churches or societies and by the income from endowment funds and tuition.

Technical Schools. Technical schools were originally schools of engineering. The first school of this sort in America was the Rensselaer Polytechnic Institute at Troy, N. Y., founded in 1824. About twenty years later the universities began to give attention to technical education, and the Sheffield Scientific School at Yale and the Lawrence Scientific School at Harvard were founded in 1847. The latter extended its scope to include courses in engineering, mining, architecture, chemistry, biology, geology and other sciences. In 1862 Congress passed the Morrill Act, which made large grants of public land to the state for establishing agricultural experiment stations. This act gave a great impetus to technical education, and now every state has its agricultural experiment station. All technical schools fit men for professions.

There are other technical schools of high order not connected with universities but doing a work of equal grade. Among these are the Rose Polytechnic Institute, Terre Haute, Ind.; the Pratt Institute, Brooklyn, N. Y.; the Case School of Applied Science, Cleveland, Ohio, and the Lewis Institute and Armour Institute of Technology, Chicago. The Massachusetts Institute of Technology, a technical school of the highest grade, has become affiliated with Harvard University. Each of these institutions is described under its title.

Technical high schools fit students for trades. There are also trade schools of a technical character, such as the textile schools in Lowell, Lawrence and Fall River, Mass.

Trade Schools. Trade schools are engaged in preparing their pupils for some trade, such as carpentry, bricklaying, printing, etc. They were established to take the place of the apprentice shop system which the introduction of modern machines has made impracticable. Most of these schools require applicants for admission to be at least sixteen years of age and to have a common school education; consequently they can do more advanced work than the elementary vocational schools.

The length of the courses varies from five or six months to four years. In the short courses most of the time is devoted to practical work. In the longer courses industrial drawing, mathematics, the physical sciences and other related supplementary subjects, together with English, American history and civil government, are required. There is a close resemblance between the trade schools with long courses and the technical high schools. W.F.R.

Moonlight Schools. Moonlight schools are schools in which adult illiterates may learn to read and write. Their advantages are also offered to literate adults who may desire to improve their education.

These schools had their origin in Rowan County, Kentucky, in September, 1911. Mrs. Cora Wilson Stewart, then superintendent of the Rowan County schools, and later chairman of the Kentucky Illiteracy Commission, is their founder. She opened the schools of the county on moonlight nights, pledged the teachers to teach all illiterates who would come, and invited the people to attend, free of charge. To the surprise of all, 1,200 persons crowded into the schools. Within three years' time, the 1,152 illiterates in Rowan County were reduced to twenty-three, only six of whom had the capacity for learning.

Twenty-five other counties in Kentucky established moonlight schools. Then the Kentucky legislature created an Illiteracy Commission, the first of its kind in the world. Five educators were appointed by the governor, with

Mrs. Stewart the head of the commission. A state-wide war against illiteracy, through moonlight schools, has been launched, and the commission organized the state for it with the slogan, "No illiteracy in Kentucky in 1920."

In 1917 twenty-two states had moonlight schools, and eleven of these were working under illiteracy commissions, all of which is a direct outgrowth of the Kentucky plan. The moonlight school ministers to illiterate fishermen on the coast of Maryland, to illiterate immigrants on the coast of California, to illiterate Swedes in Minnesota, to Indians in Oklahoma, to mountaineers in the Appalachians and to both whites and negroes in all of the Southern states. Kentucky reduced its illiteracy one-half during the three years following the creation of its commission. North Carolina taught 10,000 during 1915, and continues with energy to stamp out its illiteracy. Alabama is contesting with Kentucky for first place of honor in 1920.

The moonlight school is a rural institution, but its plan of giving illiterates educational advantages and its methods of training them quickly to read and write have been adopted in many cities where night schools for other purposes already exist.

The moonlight schools are conducted entirely by volunteer teachers. The readiness with which teachers have responded is remarkable, but is no less remarkable than the ease and rapidity with which illiterates have learned. Many have learned to read simple books and papers in two or three weeks, and some have learned to write their own letters in even a shorter length of time, showing that adult illiteracy is easy to overcome. The ages of some who have learned in the moonlight schools show that neither the ambition nor the power to learn is confined to the young. One man aged ninety-four and one aged ninety-eight learned to read and to write their own letters. Most significant are these facts for the hope and encouragement which they give to all those below these ages.

The name *moonlight school* signifies that it is a school conducted only on moonlight nights. In the beginning this was true, the moonlight being used to light the people over the roads. Their clamor for a continuous session caused the plan to be changed, and the opening week only is now regulated by moonlight nights.

Unique and attractive equipment has been prepared for these schools. Readers that deal with the road, the farm, the bank, the newspaper, and with other matters of interest to adults, and copy books with colored sheets and grooved letters make up part of this equipment. The plan is that illiterates shall not only be instructed, but also that they shall have books and supplies free of all cost. C.W.S.

Correspondence Schools, institutions organized to provide instruction in various branches of learning by means of lessons sent by mail. These schools aim to reach and benefit at least three classes of people. A person of middle age may deplore his lack of early training and seek to remedy the defect; even if his financial condition makes it possible for him to go to school, he hesitates to enter ordinary school classes on an equality with boys and girls. A teacher may wish to study under competent direction while engaged in his profession, and thus prepare for a better position or work towards a college degree. A mechanic, clerk or machinist may wish to perfect himself in his chosen vocation by evening study. To such, and to others with needs less specific, correspondence schools have made a strong appeal since President William R. Harper, of the University of Chicago, about the year 1895, declared he could teach Sanskrit by mail as successfully as in the classroom.

Dr. Harper's courses by correspondence were not the first to be offered, but he doubtless gave to the world the earliest practical ideas on the subject. The University Extension movement in England adopted such means of instruction in 1868, and America put the same plan into operation on a small scale in 1873. Since then nearly a hundred correspondence schools of every conceivable type have made their bids for public patronage. Some were organized sincerely to promote education; of this class are the correspondence study departments of the universities of Chicago and Wisconsin, of several state universities and a very few privately-owned institutions; others have been conducted by people without educational equipment whose main object has been financial gain. The schools of the latter class have injured the cause of correspondence instruction by breaking down the confidence of the public; it has been impossible for the prospective student always to determine the educational soundness of the school which sought his patronage, and often he has failed to receive adequate return from his investment.

In a properly conducted school of this kind lessons or textbooks prepared by experts are sent to the student, together with printed suggestions for study, which compare well with the

usual oral suggestions of the classroom. After completing his study of each lesson the student answers a set of examination questions; these answers assume the importance of a recitation paper. This paper is mailed to the school, and there it should pass into the hands of a competent and conscientious instructor. He should indicate all errors, give advice where it is needed and return the paper to the student rich with suggestions and aids for further study. The school that does not rise to its highest opportunity in these all-important particulars is unworthy to survive.

The largest opportunities for special schools of this class seem to center in the industrial fields, for here it is that public school instruction is almost entirely lacking. Electrical engineers, metal workers, mechanical engineers, civil engineers, plumbers, draftsmen, surveyors, structural engineers, chemists and the like are being prepared for their life work by reputable correspondence schools. At the University of Chicago a person may complete by correspondence one-half of the work required for a degree; the allowance is nearly as great in some other schools of high rank. E.D.F.

Related Subjects. The reader who is interested in the subject of schools is referred to the article on EDUCATION, page 1929. It has numerous subheads, while at the close of the article, on pages 1954 and 1955, there appears a long list of topics which may also be consulted in this connection.

SCHOOL GARDEN. In the great movement which has as its slogan "Back to the farm," the school garden is having no slight influence. Today there are in Europe over 100,000 gardens cultivated by pupils, and the School Garden Association of America has members in every state in the Union and in most of the Canadian provinces, as well as in the dependencies of the United States. A garden is a practical laboratory in which the pupils gain first-hand knowledge of the principles of nature study, agriculture, botany, manual training and physical exercise, and gardening is easily correlated with arithmetic, geography, drawing, composition, bookkeeping and other school subjects. Furthermore, the cultivation of the soil is of fundamental importance in helping solve the problem of keeping the world's population fed. School gardens are, therefore, an advantage from every point of view.

Best results are achieved in those communities where the school garden is conducted as a part of the regular curriculum, and the board provides a specially trained instructor to direct the regular teachers and to supervise the work. At the same time much has been accomplished by schools not so fortunately provided for. In some communities the gardening has to be done outside of regular school hours, but even so the results have been such as to create favorable interest in the movement throughout the community. The question of space is also a problem that must be dealt with differently in different localities. If possible, the school-garden plots should be in or adjacent to the school yard. If it is impracticable to give each pupil a separate plot to take care of, the garden may be divided into rows. Every pupil should have a definite work to do, and be required to record the results of his work in a permanent booklet. Where the space is very limited the teacher should encourage the planting of window-box gardens. Even the borders along the edges of yards can be utilized.

In the articles BOYS' AND GIRLS' CLUBS and GARDENING will be found the practical details one needs to know in carrying on gardening work of this nature. The Division of Home and School Gardens, of the United States Department of Agriculture, will respond to all requests for help and information. See, also, list of Related Subjects, in article GARDENING.

SCHOPENHAUER, *sho'pen hou er,* ARTHUR (1788-1860), a German scholar who formulated a system of pessimistic philosophy. He believed that the only "necessary reality in the universe is will," and by will he meant blind force, capricious and contrary as often as it was rational. There is, therefore, no reason to believe that things will ever be better. To secure happiness one must restrain all desires and appetites and aspire to a condition of negation similar to the Nirvana of Buddhism (which see). Schopenhauer was born in Danzig, Prussia. In 1809 he began the study of medicine at Göttingen University, but abandoned it for the study of philosophy; in 1813 he was graduated from the University of Jena. Between 1814 and 1818 he made Dresden his home, writing at this time his greatest work, *The World as Will and Idea.* Later he endeavored to lecture in Berlin in opposition to Hegel, the apostle of idealism, but was unsuccessful (see HEGEL, GEORG WILHELM). Disappointed and embittered, he removed to Frankfort-on-the-Main, where he spent several years in seclusion. Late in his life and after his death the fame he had longed for attached itself to his name. Though he overemphasized the tragic aspect of life, he performed a worthy service in the field of speculation.

SCHUBERT, *shoo'bert,* FRANZ (1797-1828), a German musician to whom the nations owe a debt of gratitude, for he is the composer of some of the world's greatest songs. His *Erlking; Hark, Hark the Lark; Wanderer, Serenade* and many others are unsurpassed in melody and charm, and are known to countless lovers of music the world over. Liszt characterized Schubert as the "most poetic musician that ever lived." He was born at Vienna of a musical family, and at home learned the fundamentals of piano and violin playing. His subsequent mastery of instrumental playing and of composition, however, came about largely through independent study and association with the best musicians of his time. He began to compose before he was fourteen, and his famous *Erlking* and *Wanderer* were created when he was only nineteen. Schubert was long hampered by poverty and lack of public recognition of his genius. He had to devote much precious time to the drudgery of teaching, and none of his compositions was published until 1821. His immature death, when he was but thirty-two, was the result of overwork and a bitter struggle with poverty and disappointment.

FRANZ SCHUBERT

It is a remarkable tribute to the creative genius of the young composer that in spite of these handicaps he left to posterity over 600 songs, nine symphonies, two of which—the *Unfinished in B Minor* and *Symphony in C Major*—are famous; numerous instrumental pieces for piano and violin, masses, choruses, operas and an oratorio. His songs alone would place him among the immortal masters, but some of his instrumental compositions are of imperishable fame. Schumann's well-known tribute to Schubert is an excellent summary of his genius:

> He has strains for the most subtle thoughts and feelings, nay even for the very events and conditions of life; and innumerable as are the shades of human thought and aspiration, so various is his music. Whatever his eye beholds, whatever his hand touches, turns into music.

Consult Duncan's *Schubert;* Mason's "Schubert," in *Romantic Composers.*

SCHUMANN, *shoo'mahn,* ROBERT (1810-1856), a German musician who ranks with Schubert as a composer of songs, and with Chopin and Liszt as a master of piano technic. He was born at Zwickau, Saxony. Schumann's mother wished him to become a lawyer, and the boy registered as a law student at the University of Leipzig when he was eighteen. His musical preferences, however, were too strong to admit of his adopting the legal profession. At the age of eleven he had set the 150th Psalm to music, but he seems to have had no systematic instruction in music until he settled in Leipzig. There he became the pupil of Friedrich Wieck, whose daughter Clara, herself a skilful pianist, became his wife in 1840. Under Wieck's instruction Schumann made rapid progress, but his career as a pianist was cut short by a permanent injury to one of his fingers, the result of overzealous practice. He had determined, however, to abandon the profession of law, and at the age of twenty-one took up definitely his work as composer and musical critic.

ROBERT SCHUMANN

In 1834 he joined with several other young enthusiasts in founding a journal *(Neue Zeitschrift für Musik)* for the encouragement of high ideals in music. Through this periodical Schumann called the attention of the public to the genius of Chopin, and gave loyal support to such rising musicians as Schubert, Mendelssohn and Berlioz. The period between 1834 and his marriage to Clara Wieck was rich in the products of his own genius, for it gave to the world his first symphony and some of his finest songs. Between 1840 and 1844, when he removed to Dresden, he composed the beautiful Cantata *Paradise and the Peri* and a famous quintet for the piano, and in the latter year began his composition of the music for Goethe's *Faust.* In 1850 the Schumanns removed to Düsseldorf. During their sojourn here the composer's mind and health broke down, and he died in 1856 in a private asylum for the insane near Bonn.

As a song writer Schumann is regarded as a disciple of Schubert, but he surpassed the latter in ability to make the music express the

varying shades of feeling represented by the words. His songs were written to poems of Goethe, Heine, Byron, Burns, Moore and other lyrists. Schumann's wife edited his complete works, which fill thirty-four volumes. B.M.W.

Consult Oldmeadow's *Schumann;* Mason's "Schumann," in *Romantic Composers.*

SCHUMANN-HEINK, *shoo'man hyngk',* ERNESTINE, née RÖSSLER (1861-), one of the greatest contraltos of her age, a marked favorite both as a grand opera star and as a concert singer. She was born at Lieben, in Bohemia. At the age of seventeen she appeared in Dresden in her first grand opera rôle, that of Azucena in *Il Trovatore,* and for many years thereafter sang in various parts of Germany. In 1883 she was married to a Mr. Heink, and ten years later to Paul Schumann. Madame Schumann-Heink gave her first performance in an American city at the Metropolitan Grand Opera in New York, in 1898, and she occasionally appeared thereafter as a guest artist with the Chicago organization. Though she is preëminently successful in the majestic contralto rôles of Wagner's operas, her deep, rich voice is enjoyed quite as fully when she sings simple folk songs in her recitals. She raised a large family of children and has simple, domestic tastes. During the War of the Nations two of Madame Schumann-Heink's sons enlisted on the side of America, and one of them fought for Germany.

ERNESTINE SCHUMANN-HEINK

SCHURMAN, *shoor'mahn,* JACOB GOULD (1854-), an American university president, born at Freetown, Prince Edward Island. He received his early education in Canada, where he won the Gilchrist Dominion Scholarship in 1875. Later he studied at the Edinburgh University, and, having been elected to the Hibbert traveling fellowship in 1878, spent two years at Heidelberg and Berlin. When twenty-six years of age he was appointed professor of psychology and English literature in Acadia College. Two years later he was appointed to a similar position at Dalhousie College. In 1886 he became a member of the faculty of Cornell University, at Ithaca, N. Y., as professor of philosophy, and in 1891 was made dean of the Sage School of Philosophy at Cornell. In 1892 he was elected president of the university.

President McKinley appointed Professor Schurman chairman of the first United States Philippine Commission in 1899, and he spent a year in the islands. In 1912 he was appointed by President Taft United States minister to Greece and Montenegro. He is the author of *Kantian Ethics and the Ethics of Evolution; The Ethical Import of Darwinism; Belief in God, Agnosticism and Religion; A Generation at Cornell; Philippine Affairs, a Retrospect and Outlook* and *The Balkan Wars, 1912-'13,* a course of lectures delivered at Princeton.

SCHURZ, *shurtz,* CARL (1829-1906), a German-American soldier, statesman and editor, a champion of freedom in two countries. In the words of former President Eliot of Harvard, he was "the greatest American citizen of German birth."

CARL SCHURZ

Carl Schurz was born at Liblar, Prussia, and was educated at the University of Bonn, where he aided in the publication of a newspaper of liberal tendencies. He escaped arrest during the revolutionary period in 1848 by hurrying to Switzerland; from there he worked his way to Paris, where he served as correspondent to German papers. He next went to London and then emigrated to America (1852), hoping there to carry out his theories of universal liberty. He became a citizen of Wisconsin, found support as a journalist and lawyer, and became celebrated as an eloquent orator, for he had acquired a remarkable command of English. He was a delegate to the Republican national convention which nominated Lincoln, and was rewarded for his campaign services by appointment as minister to Spain. This position he resigned on the outbreak of the War of Secession. Schurz was commissioned brigadier-general in 1862 and major-general in 1863, and took part in the battles of Bull Run (second), Chancellorsville, Gettysburg and Chattanooga.

After the war capitalists assisted him in establishing a German paper in Saint Louis (the *Westliche Post*) which became a power in the West. In 1869 he took his seat as United States Senator from Missouri, being the first American citizen of German birth to enter the Senate. He was one of the first to oppose Grant's reëlection, and presided over the convention which nominated Greeley for the Presidency. When Hayes became President Schurz was appointed Secretary of the Interior, serving from 1877 to 1881. In the latter year he became editor-in-chief of the New York *Evening Post,* formerly edited by William Cullen Bryant. The *Post,* which had been popularly regarded as the personal organ of Mr. Bryant, increased in circulation and influence under the management of the new chief, who, however, retired from the editorship in 1883. In 1892 he was elected president of the National League for Civil Service Reform, and after nine years resigned on account of his declining strength. He died in New York City, May 14, 1906.

Schurz published a volume of *Speeches,* a book of *Reminiscences,* a biography of Henry Clay in the "American Statesmen Series," and an admirable essay on Lincoln. M.R.T.

SCHUYLER, *ski'ler,* PHILIP (1733-1804), an American patriot, statesman and Revolutionary general, distinguished for the part he bore in the campaign which ended in the surrender of Burgoyne. He was descended from Dutch ancestors who came from Holland and settled in Albany, N. Y., where he was born. In 1755 he recruited a company to fight against the French and Indians and showed unusual military skill. Later he engaged in business in Saratoga, where he built the first American flax mill. Schuyler was a delegate to the Continental Congress in 1775, and after the Battle of Bunker Hill was appointed major-general in the continental army, being placed in command of the Northern New York division. His command of the colonial forces, however, did not long continue, as Gates managed to have himself unfairly appointed by Congress in his place; but Schuyler remained with the army, and to him is due the credit of Burgoyne's surrender (see SARATOGA, BATTLES OF). For alleged neglect of duty at Ticonderoga he was tried by court-martial, but was acquitted with honor. He secured the neutrality of the Six Nations and was later elected to numerous state offices, and to the United States Senate. He is buried in Trinity Churchyard, New York City, within a hundred feet of busy Broadway, and next to the grave of his father-in-law, Alexander Hamilton.

SCHUYLKILL, *skool'kil,* a river in Pennsylvania, whose name is a Dutch word meaning *hidden channel.* It rises in a county of the same name, and flows southeastward for about 100 miles, entering the Delaware River at the southern limit of Philadelphia. It furnishes water power for manufacturing at Reading, Pottsville, Phoenixville, Norristown and Philadelphia. Along its lower portion in Philadelphia there are extensive wharves. The greater portion of the water supply of the city also comes from the Schuylkill, the government having installed a filtration plant in 1901-1908 at a cost of $25,000,000. By a Congressional appropriation (1914) funds were provided to widen the Schuylkill channel from Walnut Street, Philadelphia, to the Delaware, for port development.

SCHWAB, *shwahb,* CHARLES M. (1862-), an American capitalist who amassed a great fortune in the steel industry. He was born at Williamsburg, Pa., but spent his childhood in Loretto, in the same state. While still a boy he drove a stage from Loretto to Cresson, a distance of five miles. Schwab's connection with the steel industry began with his employment by the Carnegie Company as a stake driver in the engineering corps of the Edgar Thompson Steel Works. He rose steadily to the position of general superintendent of the Homestead Steel Works, serving in this capacity from 1892 to 1897. He later devoted his energies to putting the steel industry on a "trust" basis, and in 1901 became president of the vast United States Steel Corporation. In 1903 Schwab became president of the Bethlehem Steel Corporation, a company which took over enormous munitions contracts to supply the allies during the War of the Nations.

CHARLES M. SCHWAB

SCHWATKA, *shwot'ka,* FREDERICK (1849-1892), an American Arctic explorer, born at Galena, Ill. Graduating in 1871 from West Point, he became second lieutenant in the United States army, after obtaining degrees in both medicine and law. Becoming interested in Arc-

tic exploration, he obtained leave of absence in 1878 and undertook an expedition in search of records and remains of Sir John Franklin and his party. He traveled by sledge a distance of almost 3,000 miles, and explored carefully the northern coast of America in the region where Franklin had been, and a part of King William Land. His search was rewarded by the discovery of graves, skeletons and valuable buried records. This was the last expedition sent out to look for traces of Franklin. Later Schwatka headed other exploring parties, in Alaska and in Mexico, and received honors from various scientific societies. He resigned his commission in the army in 1885. His published works include *Along Alaska's Great River*, *Nimrod in the North* and *Children of the Cold*. See POLAR EXPLORATION.

SCIENCE AND THE SCIENCES. The question "Why?" has probably been asked more times in the history of the world than any other. It is the favorite question of children, and as even the wisest of men are but children in knowledge, it has been the constant query of mankind since it was first uttered. The answers which men have found, the organized knowledge they have acquired by observation and reasoning, make up what we call the sciences. The word *science*, standing alone, means merely *knowledge;* it comes from the Latin word *scio*, to know.

The truly scientific student never jumps to a conclusion. No matter how logical an explanation appears, or how plausible a statement may be, he must treat it as a *hypothesis*, or *supposition*, until it is proved beyond doubt. He works from his knowledge of the universal law of cause and effect, which tells him that any set of circumstances always produces the same results, and that in nature there are no exceptions to a rule. A good example of the scientific attitude is the story of the discovery of the planet Neptune, told in the article ASTRONOMY.

The Sciences. In ancient times, and even during the Middle Ages, there was little attempt to differentiate between the sciences, for scientific knowledge was limited. A distinction was drawn between the theoretical and the practical sciences, but that was in effect merely a distinction between what would to-day be called philosophy and science proper. Until modern times the general term *natural history* was in common use to describe the study of all life, whether plant or animal; while *natural philosophy*, or *physics* included the study of all inorganic phenomena. As scientific knowledge increased, however, a more and more close classification became necessary. To-day the sciences are divided and subdivided, and a student often specializes in but a subdivision of a science, while possessing but a general knowledge of the entire broader subject.

Thus the sciences named in the following list are not all coördinate in value; ethnology and ethnography, for instance, are branches of anthropology, while botany and zoölogy are divisions of biology. All, however, have the right to be considered as sciences, and all are treated under their proper headings in these volumes:

Algebra	Geometry
Anatomy	Mathematics
Anthropology	Meteorology
Archaeology	Minerals and Mineralogy
Arithmetic	Numismatics
Astronomy	Oceanography
Biology	Paleontology
Botany	Philology
Chemistry	Philosophy
Economics	Phonetics
Ethnography	Physics
Ethnology	Physiology
Eugenics	Psychology
Geodesy	Sanitary Science
Geography	Sociology
Geology	Zoölogy

Under many of the articles above are given lists of scientists; thus the distinguished chemists whose biographies appear in these volumes are listed under CHEMISTRY, the geologists under GEOLOGY, and so on. Certain scientists, however, who cannot be thus classified, are indexed here:

Finsen, Niels Ryberg	Langley, Samuel P.
Galton, Sir Francis	Loeb, Jacques
Henry, Joseph	Metchnikoff, Elie
Kelvin, Baron	Tyndall, John

C.H.H.

Consult Pearson's *Grammar of Science.*

Pseudo-Sciences. This term is useful to describe the several pursuits which in one view constitute the antecedents of modern science, and in another show the survival of outgrown habits of thought and the persistence of the cruder products of inquiry. These beliefs and practices form a significant part of the history of thought and of the struggle of men to guide conduct by knowledge. The pseudo-sciences arose as ambitious attempts to explain the world of things and events and the unseen world of spirits and forces patterned upon the fears and desires of men. They proceed from rather vague notions to systematic conceptions; their logic is weak and involves a confusion of

wish and fact, of imagination and reality. The demand for proof is slight, and the satisfaction of belief urgent. At every stage the mind reaches out for a complete solution, for some system of explanation that makes a whole out of detached happenings, and furnishes some sort of clue to the meaning of existence. In the course of such pursuits a considerable body of observations accumulates; but these are held together by the system that is imposed upon them. At early stages such lore is religion and philosophy and science in one; out of the notions thus favored, and thus developed by systematic interpretation, crudely scientific, the earlier pseudo-sciences arise. The later ones have a different history. The best known of these, such as alchemy, astrology, palmistry and others listed below, are treated in these volumes.

A common motive of these pursuits is the control of personal fortune by guessing the secret of its source; more directly to read the signs of qualities and fate in the appearances of nature and of the human form. Primitive thinking looks upon the universe of things and events—the movements of nature, the sky and land and sea and all that they contain—as a setting for human fate, and looks upon the forces in operation as acting after the manner of human motives. The insight into nature is so uncertain and perplexed, that only some fortunate penetration of the mystery can avail. Weak analogies are accepted, and the body of tradition based upon them is carried forward in a cult of mystic practices. J.J.

Related Subjects. The following articles, if they do not all deal with pseudo-sciences, strictly so called, at least treat of closely-related topics:

Alchemy	Occult
Astrology	Palmistry
Clairvoyance	Phrenology
Conjuring	Physiognomy
Demonology	Psychical Research
Divination	Psycho-Analysis
Faith Cure	Spiritualism
Hypnotism	Suggestion
Magic	Superstition
Medium	Telepathy
Mesmerism	Theosophy
Mind Reading	Trance
Necromancy	Witchcraft

SCILLY ISLANDS, *sil'ly,* a group of islands belonging to Great Britain, about thirty miles from Land's End, on the coast of Cornwall, England. They are about 140 in number, of which only six are of any importance, namely, Saint Mary, Saint Agnes, Saint Martin, Tresco, Bigher and Sampson. The capital is Hugh Town, on Saint Mary. The group of those inhabited has an area of 4,041 acres and a population of about 2,100. On the islands are found many remains of Druid circles and barrows, and on the Isle of Sampson was found a perfect "Kistvaen," or sepulchral chamber of stone.

The islands are wild and picturesque, with bold and rugged cliffs facing the Atlantic Ocean. The climate is extremely mild, and flowers that cannot be grown anywhere in England are produced in great profusion. The inhabitants are chiefly engaged in fishing, flower growing and agriculture. Vast quantities of narcissus, jonquils and other flowers are sent to the London markets early in spring, and the first new potatoes to be obtained in England usually are sent from the Scilly Islands.

SCIO, *si'o,* the ancient CHIOS, an island in the Mediterranean Sea about fifty miles west of Smyrna, in Asia Minor, and belonging to Turkey. It covers an area of 400 square miles and has a mountainous surface, the formation being principally chalky limestone. The climate is delightful and the soil fertile, producing grapes, oranges, lemons and almonds in great abundance.

In 1881 the island suffered from the effects of a terrible earthquake, previous to which it had been one of the richest and most productive islands in the Mediterranean Sea. The chief exports are leather, distilled spirits, fruits, cheese, silk, wool, salt, cattle and wine; the latter has been famous for centuries. The capital is Chios, which had a most important place in ancient history. The island was captured by the Turks in 1566 and was given to the sultana, under whose protection it flourished for a considerable time. Chios by some is supposed to be the birthplace of Homer.

SCIOTO RIVER, *si o'toh,* a river draining the central part of the state of Ohio. It rises in Auglaize County, flows eastward and then turns southward, emptying into the Ohio River at Portsmouth. Its most important tributaries are the Little Scioto and Brush Creek; the largest cities along its shores are Columbus, Chillicothe, Circleville and Portsmouth. The Scioto is about 225 miles long and is navigable for 130 miles. It is also a feeder for the Ohio and Erie Canal, which runs nearly parallel with it from Cleveland to Portsmouth. The river is used as a commercial route for the transportation of coal, iron, cement, oil and agricultural products; the whole tributary region is one of fertility and mineral wealth.

SCIPIO, *sip'i o,* the name of an aristocratic Roman family, two members of which achieved distinction in the wars against Carthage.

Publius Cornelius Scipio (237 B.C.-185 B.C.), called AFRICANUS MAJOR, is regarded as the greatest Roman general before Julius Caesar. He came into prominence when Rome was fighting the army of the great Carthaginian leader, Hannibal, in the Second Punic War. In 205 B.C. he was elected to the consulship and a year later invaded Africa with a large army. At Zama, in the year 202, he inflicted a decisive defeat on the Carthaginians, and brought the war to a close. Scipio returned to Rome a popular hero, was accorded a triumph and received the surname *Africanus.* (*Major,* meaning *elder,* was added to distinguish him from a younger member of the family [see below] who also won the surname *Africanus.*) Towards the close of his life Scipio became involved in a political conspiracy, but on the day set for the trial he delivered an eloquent speech in which he reminded the people of the victory at Zama, of which that day was the anniversary. This stopped further proceedings against him, and he then retired to his country seat in Campania, where he died.

Publius Cornelius Scipio Aemilianus I (185 B.C.-129 B.C.), surnamed AFRICANUS MINOR (the Younger), was a grandson of the Elder Scipio by adoption. During the memorable siege of Carthage, the surrender of which ended the Third Punic War, he was elected to the consulship and given supreme command of the army in Africa. On the fall of the city, in 146 B.C., he returned to Rome, where he later held the office of censor. In 134 B.C., having been reëlected consul, he reduced the city of Numantia, in Spain, after the conquest of the Numantines had been attempted in vain by several consuls. Thereafter he devoted himself to political affairs, being one of the leaders of the aristocratic party. Scipio was the brother-in-law of Tiberius Gracchus. He was a man of culture and refinement and a loyal patriot.

Related Subjects. The following articles in these volumes will make clear the references in the above discussion:

Carthage	Gracchus
Censors	Hannibal
Consul, subhead *The Roman Consul*	Punic Wars

SCISSORBILL, *siz'er bill,* or **SKIM'MER,** a bird of the Atlantic region, related to the gulls and terns, having a thin, bladelike bill with the lower mandible much longer than the upper. The bird obtains its food by skimming rapidly along the surface of the water with its beak opened wide and the lower mandible thrust below the surface, thus scooping up insects, small fish, shrimps, etc. Its wings are short, and in flying the body is held at an angle to keep them from touching the water. The plumage is black above, with a good deal of white tipping the feathers, and is pure white underneath. The nest is a depression in the sand, and the eggs, three or four in number, are white or buffy white in color, heavily blotched with chocolate.

SCORPIO, *skawr'pi o,* THE SCORPION, one of the signs of the zodiac, a constellation considered by astrologers to exercise a most harmful influence on human destinies. According to Greek mythology, the scorpion killed Orion; the latter boasted that he would kill every poisonous reptile on earth, so Diana sent the scorpion to sting him, and he died. The scorpion also frightened the horses of the sun when Phaethon, the son of Helios, endeavored to drive them, causing the incautious driver to be thrown out of the chariot and killed by Jupiter in vengeance for having driven the sun too near to the earth.

Antares, the brightest star in the constellation, is of the first magnitude, with a companion of the seventh magnitude. Aries is the second sign of the zodiac. The name of this beautiful star, Antares, shining with a deep red light, shows that it is anti-Aries, meaning opposed to or opposite Aries. In this constellation, according to Ptolemy, there are twenty-four stars. Scorpio and Orion both appear in the heavens as bright constellations. Scorpio is easily recognized. It looks much like a boy's kite, with a very long tail.

Related Subjects. The reader is referred to the following articles in these volumes:

Aries	Orion
Astronomy, page 444	Zodiac

SCORPION, *skawr'pi un,* a group of animals belonging to the same class as the spiders, mites and ticks (see ARACHNIDA), found in warm countries in most parts of the world. In the United States, in which Nebraska is the northern limit of their range, there are about twenty species. A scorpion is dreaded by man because of its poisonous sting, dealt from a curving organ on the last segment of the tail. Two glands at the base of the segment secrete a poisonous fluid that flows out of two pores, and the wound inflicted by the animal is exceedingly painful, though not usually fatal.

The poison should be sucked or squeezed out of a wound, and the spot should be bathed with ammonia.

The body of a scorpion consists of two divisions—a short, forward part, made up of the head and thorax, which are united; and a long abdomen, the last five segments of which form a slender tail. On the front end of the body, called the *cephalothorax,* there are two pairs of appendages bearing pincers, and four pairs of legs; the pincers of the second pair of appendages resemble the claws of a lobster. The number of eyes varies on different species from

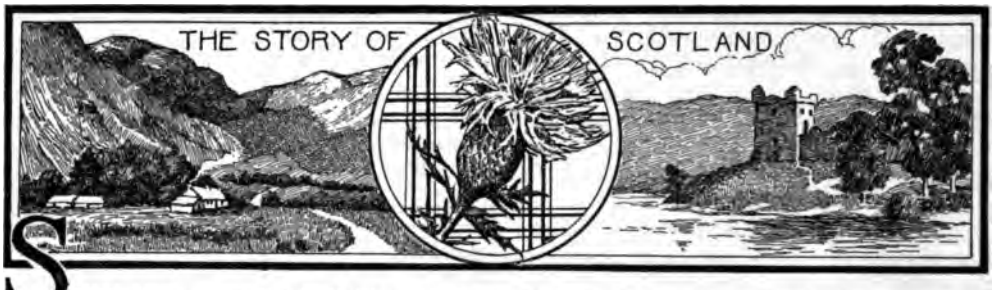
THE SCORPION

six to twelve. On the abdomen are found the breathing pores. Young scorpions stay with the mother for several days after birth, clinging to her body with their tiny pincers. Scorpions feed on large insects and spiders, and are chiefly active at night. They are usually black or yellowish in color.

Consult Comstock's *Manual for the Study of Insects.*

SCORPION FLY, a family of insects bearing a general resemblance to scorpions, to which fact the name is due. They belong to the order *Mecoptera,* the name of which means *long-winged.* These insects are from one-half to three-quarters of an inch in length and have two pairs of netted wings as long as the body. The body of the male ends in two slender, pincerlike appendages, somewhat like a scorpion's sting. These pincers can be used as forceps for clasping objects, but they are not a stinging organ such as the scorpion possesses. The life history and habits of the scorpion flies are not well understood, but they are believed to feed on dead animal matter and to lay eggs in crevices in the ground. The larvae, which resemble caterpillars, hatch in about a week and grow rapidly.

SCOTCH TER'RIER, a breed of dogs originating in the Scotch Highlands. The standard Scotch terrier is a small animal weighing from eighteen to twenty pounds, with a rough, coarse coat, large, upright ears, pointed nose, and tail carried sharply erect. The hair is dense and wiry, and in color is gray, black, grizzly or sandy. These terriers are alert and active, and are useful in catching mice and other pests. Their intelligence and affectionate ways make them interesting household pets.



SCOTLAND, a political division of the United Kingdom, occupying the rugged, northern part of the island of Great Britain, and including the Hebrides, Orkney, Shetland and other islands. This country was called *Caledonia* by the Romans, and later received the name of Scotland from the Scots, a tribe from Ireland, for that country anciently was known as Scotia. The stern and wild beauty of this—

"Land of brown heather and shaggy wood,
Land of the mountain and the flood,"

its warring clans and its hardy heroes, have been celebrated in legend, poetry and song.

Size and Location. Scotland is separated from England by the Solway Firth, Cheviot Hills and the River Tweed, and on all other sides is bounded by arms of the sea. Having an area of 30,404 square miles, it is about as large as the state of South Carolina, or as New Brunswick and Prince Edward Island combined.

The People. A rugged land, vigorous climate and lack of great wealth have developed the hardy Scotchman. The brawny Highlanders, the tallest people in the world, averaging from five feet eight inches to six feet in height, and

their thrifty brothers of the Lowlands, inherit from their warring ancestors their loyalty to country and clan, their frugality and their energy. Although the Scotch are a practical and sober people, their history is full of romantic and heroic legend. The national dress of bright plaid kilts is still worn by the Highland troops, and town and countryside still echo to the noisy, strange music of the bagpipe, which long ago replaced the harp of the ancient bards. Bands of Highland troops in their kilts performed some of the most daring feats in the War of the Nations, and a regiment of Scotch-Canadians won from their German opponents the name "Ladies of Hell." The clan or tribe, which in no other European country has played so conspicuous a part in history, is still important in the social life.

Over one-tenth of the people of the United Kingdom live in Scotland. The population, which was 4,760,904 in 1911, is about equal to that of the state of Ohio, and exceeds that of either Quebec or Ontario, the largest Canadian provinces. In the Highland districts the population is scattered, but the Lowland region near the great cities of Glasgow and Edinburgh is one of the most thickly inhabited districts of Great Britain. Almost the entire population is native Scotch; only seven per cent are of Irish and English birth, and less than one per cent are foreigners. The townward movement among the rural inhabitants is increasing, and over three-fourths of the people are inhabitants of burghs and cities, the largest of which are Glasgow, having 784,496 inhabitants, Edinburgh, a little less than half its size, and Dundee and Aberdeen, each having a population of over 160,000. The agricultural communities, especially, have suffered from the large emigration to the United States and to distant British colonies, principally Canada, "the Scotland of America."

Religion. Scotland is the home and stronghold of Presbyterianism, and most of the inhabitants are members of the established United Free Church of Scotland. Two other denominations, the Episcopal and Roman Catholic bodies, are increasing in numbers, but are still comparatively unimportant.

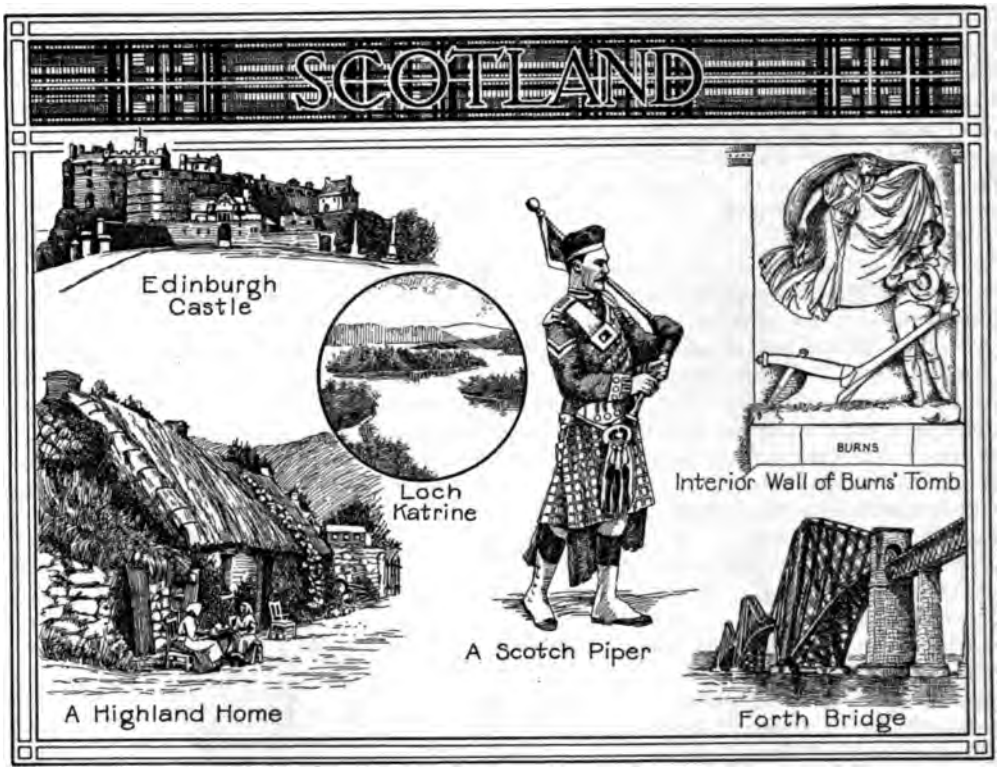
Language and Literature. Although the ancient Scottish vernacular may still be heard in many communities, and there are various dialects in different localities, the modern language of Scotland is English. Until the fifteenth century, a distinct Scotch, or Gaelic, tongue was spoken in the Highlands, but the dialect of the Lowlands was much like that of Northern England. This Gaelic tongue, affected by the Latin and French influence of the fifteenth and sixteenth centuries, remained the national language of the Highlanders until the union with England.

Until the eighteenth century Scotland had a distinct national literature. The ballads and songs of the bards, the romance of *Sir Tristram* by Thomas the Rhymer, the tales of *The Bruce* by Barbour and stories of the deeds of Wallace by "Blind Harry" exerted a great and lasting influence on the work of the later poets of both Scotland and England. James I, Dunbar, Douglas and Lyndsay are prominent Scottish poets of the fifteenth and sixteenth centuries. The later writers of Scotch birth, including Robert Burns, Sir Walter Scott, James Hogg, Joanna Baillie, George Macdonald, Robert Louis Stevenson, John Watson (Ian Maclaren) and James M. Barrie, are discussed in the history of English literature, and most of them are noted in these volumes under their separate titles.

LOCATION MAP

Showing the relative sizes of the divisions of the British Isles.

Education. Scotland surpasses all other parts of the United Kingdom in the excellence of its elementary and secondary educational sys-



tems. The many religious and civil struggles of the country did not prevent the early provision for public instruction. In 1872 the Scottish Educational Department was created, and boards having charge of elementary and secondary schools were elected in every burgh and parish. These boards may impose religious instruction, but children are not compelled to receive such instruction. Since 1891 instruction has been free to all between the ages of three and fifteen years and compulsory between the ages of five and fourteen. Parish schools are chiefly elementary, secondary education being given in academies and burgh schools. Unlike England, Scotland has never had many private boarding schools.

The growth of technical education in recent years has been remarkable. In every important town technical schools have been established, and instruction is also provided in rural districts. The Royal Technical College at Glasgow, the largest institution of its kind in the British Empire, and among the most important in the world, is the center of technical education.

In higher education, too, Scotland is in advance of England, having more universities and a much larger attendance in proportion to the population. Women are admitted on the same conditions as men, and university education may be had at much less expense than in England. The universities are aided by the government and by an annual income of $2,500,000 from the gifts of Andrew Carnegie. The prominent universities are Saint Andrews, founded in 1411; Glasgow, 1450; Aberdeen, 1496; and Edinburgh, 1582.

The Land. The Northern Highlands, occupying one-third of Scotland, are a region of parallel, craggy ridges extending from northeast to southwest. They are furrowed and trenched by deep glens, through which flow rapid torrents and cataracts and in which lie deep mountain lakes. The rugged mountain crests form natural battlements and turrets. Their precipitous slopes are roughened by bosses and corries, or caldronlike hollows scooped out by the streams. Their deep ravines are dark with dense woods of pine and birch. Many of the summits of the Eastern Highlands are broad, undulating moors, and it is said that in this region there is more level land on the mountain summits than in the valleys. As one journeys westward, the peaks become higher and

more craggy. The Grampian Hills in the west, the loftiest mountains of Scotland, are separated from the Northern Highlands by Glenmore, a deep glen which stretches across the country from sea to sea. Here Ben Nevis, the highest mountain of Great Britain, rises to an elevation of 4,406 feet. The deep glens, craggy peaks, lovely moors and beautiful lakes, echoing to the din of Highland battle, have become famous through Scott's *Lay of the Last Minstrel, Marmion* and the *Lady of the Lake.* The central plain, a region of grassy slopes and dells, rippling brooks and wooded hills, lies between the Highlands and the Southern Uplands (see below). It resembles the rolling fields of England, and is the richest mineral and agricultural region of Scotland.

Rising abruptly to the south are the Uplands, a rolling table-land of grassy moors, broken by low, verdant mountains and a few bare precipices. The grassy heights furnish pastureland for large flocks of sheep, and in the valleys grains and other crops are grown. To the Uplands belong the Cheviot Hills, famous in border warfare.

The land is penetrated by many inlets, or sea *lochs,* and few places are more than forty miles from the sea. Because of the remarkable irregularity of the coast line, Scotland, though smaller than England, has more miles of seacoast. On the west the cliffs rise from the sea in a great rock wall, in some places projecting in rough piers and buttresses, in others, cut by deep, narrow fiords resembling those of Norway. Tall pillars of rock, called *stacks,* are often left standing alone amidst the waves, and are the lonely habitation of myriads of sea birds. Numerous islands border this western coast, including the Hebrides and the Isle of Skye. The largest of the sea lochs penetrating the west shore are the firths of Lorne and Clyde.

On the east coast, the Firth of Forth and Moray Firth extend far inland. These inlets and the Firth of Tay are bordered by low, sloping beaches, but in the south the Uplands plunge boldly to the sea, and a few rocky cliffs rise between the sandy beaches to the north. Caithness, in the extreme northeast, meets the sea in a broad, level moor. The rocky Orkney and Shetland islands are the only groups off the north coast.

Rivers and Lakes. The most important commercial river of Scotland is the Clyde, upon which Glasgow is situated. This river flows into the wide Firth of Clyde, an inlet of the Atlantic Ocean, but the other large rivers of Scotland flow east to the North Sea. Among these are the Tay, which has a greater volume than any other river of the British Isles, the Tweed, Forth, South Esk, Don, Dee, Spey and Findhorn. Among several small rivers of the west coast are the Ayr and the Doon. The Nith flows into Solway Firth, an inlet of the Irish Sea.

The Highland streams rush through deep, narrow gorges, and over rocky ledges in foaming cataracts. In the central and southern regions the rivers are bordered by high, grassy banks and braes.

The central and western portions of the country are studded with a multitude of beautiful lakes, ranging in size from picturesque Loch Lomond to the numerous small rock *tarns* nestling in the western mountains. Among these lakes, noted for their beautiful scenery, are the lonely and wild Loch Skene of the Southern Uplands, the Lowland Lake of Menteith, and Loch Katrine, of which Scott says:

> Where, gleaming with the setting sun,
> One burnished sheet of living gold,
> Loch Katrine lay beneath him rolled;
> In all her length far winding lay,
> With promontory, creek, and bay,
> And islands that, empurpled bright,
> Floated amid the liveller light,
> And mountains, that like giants stand,
> To sentinel enchanted land.

Climate. Owing to the warm waters of the Gulf Stream, which washes the west shores of the British Isles, the west coast of Scotland is milder in winter and cooler in summer than the east coast. The North Sea has a moderating influence upon the climate of the eastern shore, but in a much smaller degree. Summers are cool throughout Scotland, and winters are cold, especially in the inland districts, where the mountains and uplands are covered with snow three months of the year. Much of the moisture of the prevailing Atlantic winds falls on the Western Highlands, where the annual precipitation exceeds 100 inches and on the summit of Ben Nevis reaches 150 inches. The eastern section is comparatively dry, especially in those districts protected by the highest western mountains, as in Tweedale, East Lothian and the lowlands of Moray Firth, where the annual rainfall averages but twenty-six inches.

Agriculture. Less than one-sixth of this mountainous country is arable land, and this is confined chiefly to the Lowland districts. The farm lands, as in England, are parts of large estates and are rented to farmers whose fami-

lies have usually held the same land for generations. This system has been a severe handicap to the capable Scotch, but when the present leases expire, the Smallholders' Act of 1911 will break up this historic land system. By this act, the farmers with small capital may obtain a holding of fifty acres, and the large, private tracts, reserved as deer forests, will be opened to cultivation.

Although farming is not pursued upon an extensive scale, intensive cultivation of available land produces large yields of cereals and vegetables. Oats, the chief food of the Scotch farmer, are by far the most important crop. Turnips, another stock food, potatoes, barley and hay are raised in large quantities. Orchard and small fruits are cultivated especially in Clydesdale, and market gardening is important near the large cities.

The grass-clad moors of the Uplands and Highlands, covering almost one-half of the total area of Scotland, are used for grazing, and stock raising is an important industry. Fine breeds of cattle, such as the Jersey, Ayrshire, Galloway and Polled Angus, are native to the Scottish Highlands. The Cheviot Hills and Highlands are famous for their sheep, the number of which is over six times that of the cattle raised. The Clydesdale draft horses and the Shetland pony are also famous Scotch stock.

Fisheries. The replacement of sailing crafts by steam trawlers and motor vessels in the fishing industry is forcing out the poor, private fisherman, who is not able to compete with the well-equipped boats owned by large companies. Owing to the proximity of all parts of Scotland to the sea and to the numerous sheltered fiords, lochs and wide-mouthed rivers, as well as inland lakes and streams, fishing has been one of the important sources of livelihood of many of the inhabitants. The salmon, whale and seal fisheries are now chiefly controlled by large companies, and many Dutch and Norwegian vessels fish in Scottish waters. The most important catches are cod, herring and haddock. Aberdeen is the center of the fishing industry. The Fisheries Board of Scotland regulates the industry.

Mining. The large fields of coal and iron in the central plain of Scotland are the foundation of the national industry. Great quantities of coal are mined in Fife and Lanark counties, in the latter of which Glasgow is situated. Ayr and Renfrew counties produce much of the iron product. From Linlithgow County are taken millions of tons of shale, which yields great quantities of shale oil. An increasing demand for this oil is assured by the substitution of liquid fuel in place of coal in the British navy. Granite, limestone, slate, fire clay and lead are of importance. The total annual value of the mineral product of the country exceeds $112,182,000.

Manufactures. In the eighteenth century Scotland's industrial interests superseded agricultural activities, and over one-fourth of the population are now engaged in manufacturing and the coal and iron industries, a proportion which is exceeded in few countries. The iron production and maritime advantages of the country have developed the largest shipyards of the world along the Firth of Clyde, and made great shipbuilding centers of Leith, Aberdeen, Grangemouth and Dundee. The great vessels of the Cunard Line and famous yachts are built in the Clyde yards, which were an important center of construction in the War of the Nations, and noted merchant clippers are constructed in the yards of the east coast.

As in England, the textile industry shows a slight decline, but it is still one of the chief manufacturing industries. Scotch yarns and woolens, including tartans, plaids and shawls, especially those manufactured in the district of the Tweed, are famous for their excellence. Linens and cottons are also extensively manufactured, the latter especially in the vicinity of Glasgow, and lace weaving and the manufacture of silk are increasing in importance.

Glasgow is also the center of the large iron and steel industry. Scotland produces about one-seventh of the pig iron of the United Kingdom. Whisky distilleries are widely scattered throughout the country. As a publishing center, Edinburgh has been famous since the sixteenth century. Glasgow has important chemical industries, and the manufacture of paper, glass, gloves and hosiery is also carried on.

Transportation and Commerce. There are over 3,800 miles of steam railroad in Scotland, and there is a complete tramway system connecting the important industrial centers of the Lowlands. The improvement of Scottish highways has been regulated by law since the twelfth century, and the roads are kept in repair by annual government grants. There has been much improvement in water transportation. The Caledonian Canal, between Moray Firth and Loch Linnhe, extends navigation across the country in the north-central section, and the Forth and Clyde Canal opens a waterway from sea to sea, passing Glasgow. The Union

Canal extends from the Clyde Canal to Edinburgh, and the Crinan from Loch Gilp to Jura Sound. Leith, Dundee, Grangemouth and Aberdeen are the large ports of the east coast, and Glasgow, Greenock and Kilmarnock are the important commercial ports of the Firth of Clyde, on the west.

As in the other divisions of the British Isles, the coasting, foreign and colonial trade is large. Great quantities of coal are exported from Glasgow and ports on the Firth of Forth, and iron and textiles are also sent out. Many of Scotland's imports are brought into the country by rail through England, and as a result the value of goods entering Scottish ports is less than one-eleventh of that brought into English ports.

Local Government. (For *Central Government* see GREAT BRITAIN.) In 1894 the Local Government Board for Scotland was created, consisting of the Secretary for Scotland, the Governor-General, the Undersecretary and three other members appointed by the Crown. The counties and parishes are administered by councils similar to those in England. Burghs or towns are governed by municipal boards, provosts and bailies. There are five kinds of chartered burghs, burghs of barony and regality, and royal, parliamentary and police burghs. In the first two, which are practically the same, there are no councils. Representatives from the royal and parliamentary burghs, which have statutory constitutions, meet together for the transaction of business. The police commissioners are the local authorities in the police burghs, and these towns may also send representatives to the convention. According to Scotch usage "police" includes drainage, paving, lighting conditions, etc.

Judicial Department. The supreme civil court is the Court of Session. The Court of Justiciary, composed of judges of the Court of Session, is the highest authority in criminal cases. The inferior courts are sheriff courts, justices of the peace, bailie, dean of guild and police courts.

History of Scotland

Early Inhabitants. At the time of the Roman invasion of the British Isles, 78-82 A. D., Caledonia, or that region north of the Forth and Clyde Rivers, was occupied by a composite race, descendants of the Celtic invaders and a non-Aryan people, the original inhabitants of the country. These Caledonians were later called Picts and were the ruling people of North Britain when it was invaded by the Scots from Ireland. The Teuton Britons invaded the south and Lowland regions, and Scotland's early history is a story of the continual warfare between the Picts of the Northern Highlands, the Scots and the heathen Teutonic invaders. The Scots were Christians before their invasion of Caledonia, and the Picts were converted by Saint Columba, the Celtic missionary from Ireland.

Establishment of the Kingdom of Scotland. In the ninth century the Picts and Scots were united under Kenneth MacAlpin, king of the Scots, and a hundred years later this kingdom became known as Scotland. Until the eleventh century, the country was chiefly occupied in wars with the Norsemen, who had settled in the Orkney and Shetland islands, and with the English in the south. Revolts and intrigues against the king were frequent among the *mormaors*, the rulers of the various Scottish provinces, and the *toisechs*, or tribal chieftains. The purely Celtic monarchy ended with the accession of Malcolm Canmore (1058), after the death of Macbeth. Malcolm strengthened the growing English influence in Scotland by his support of the English king against the Norman invaders, but he, at length, was forced to submit to William the Conqueror and do homage for his kingdom.

The feudal system in Church and State spread over Scotland in the twelfth century. David I (1124-1153), called the "Maker of Scotland," reformed justice, established towns and bishoprics, replaced Scotch lords and churchmen by English and Norman nobles and acquired Northumberland by conquest. In 1175 the Scottish king, William the Lion, was captured in an invasion of England, and for the next fourteen years Scotland was a feudal dependency of England. William's son, Alexander II, renounced his claim to the northeastern provinces of England for a yearly payment of about $1,000, but his successor, Alexander III, recovered the western islands from the Norsemen by treaty in 1266.

The Struggle for Independence (1286-1328). Although the English kings claimed an overlordship over Scottish rulers, the latter, except William the Lion, paid homage for their English possessions only. After the death of Alexander III, there were thirteen claimants to the

throne, and Edward I of England claimed the right as overlord to appoint the successor. The Scottish nobles revolted against his choice of John Baliol and formed an alliance with France. Edward then invaded Scotland and as a result of his victory at the Battle of Dunbar declared himself king. The native Scots rallied under William Wallace, the popular hero of Scottish history, and defeated the English forces at Stirling. The long and cruel wars of independence which followed ended in the victory of the Scotch under Robert Bruce in the famous Battle of Bannockburn in 1314, one of the decisive battles of the world's history.

Power of the Nobility. Bruce was crowned king, but the struggles with rival claimants to the throne were not ended. During the reign of his son, the child king, David II (1329-1371), a descendant of John Baliol, supported by Edward III of England, claimed the throne. Added to the perpetual warfare on the English border were the feuds between the powerful clans and the long struggle between the house of Douglas and the Crown. During the reigns of David and his successors, Robert II and Robert III, the powerful nobles were virtually the rulers of Scotland. Robert II was the first of the Stuart dynasty.

Order was restored and the nobles subdued by James I (1406-1437), and the Scotch-French alliance was renewed. However, during the succeeding reigns of James II and James III, history repeated itself in the renewal of feud, murder and anarchy. James IV, through his alliance with France, then at war with England, invaded Northumberland and was defeated and killed at Flodden Field in 1513. James V and his daughter, Mary, Queen of Scots, continued the alliance with France, and this and their Catholic faith made them unpopular in Scotland. The romantic and tragic life of Mary Stuart is given in detail under the heading MARY STUART. During most of her reign the court of Scotland was the center of plot and intrigue.

Religious Struggles. The religious Reformation in England spread to Scotland and reached its height in 1559 and 1560, under the leadership of John Knox. In 1560 a Reform Party Parliament assembled and established the democratic Presbyterian Church.

The religious struggles and plots of intriguing ministers continued during the reign of Mary's son, James VI. In 1603 he left Scotland to become James I of England, and from this time Scotch history is closely related to that of England (which see). Both James and his son, Charles I, attempted to draw the two countries into closer union and to establish the Church of England in Scotland, thus adding to their unpopularity among the Scotch Covenanters.

In the Civil War in England, 1642-1649, when Cromwell's Parliament Party defeated the Royalists and executed Charles I, the Covenanters took the part of Parliament. After the Restoration, in 1660, Charles II attempted to reëstablish Episcopacy in Scotland, and the strict Covenanters were cruelly persecuted. They joined the English Revolution of 1688 and proclaimed William and Mary as their sovereigns. Religious freedom was restored, but during the following reign of Queen Anne, the ill feeling between Scotland and England increased, and England saw that a union was necessary to preserve peace.

Union with England. Not without violent opposition in the Scottish Parliament, the Articles of Union were passed in January, 1707, and the two kingdoms were united under the name of Great Britain. It was provided that the Presbyterian Church of Scotland be maintained; that sixteen Scottish lords and forty-five members of the House of Commons be elected to the Parliament at London; that all rights of trade and citizenship be the same for Scotch and English subjects; that Scottish property laws, customs and private rights remain unchanged. Henceforth the history of Scotland is part of that of Great Britain.

Scotland has, without doubt, benefited from the union with England and has never made any aggressive attempt to reëstablish "Home Rule." However, in recent years there has been a revival of national feeling which has been reflected in the renewed interest in Scottish customs, language and literature. There is also widespread feeling that the Scottish department of government should be situated in Edinburgh, rather than in London. The Scottish troops distinguished themselves for their loyalty and gallant action throughout the War of the Nations, winning special recognition for their conspicuous bravery in the Battle of Loos, in the second attack at Ypres, at Longueval and at Messines. E.B.P.

Consult Lang's *Short History of Scotland;* Brown's *History of Scotland to the Present Time;* Oliphant's *History of Scotland for the Young.*

Related Subjects. The reader who is interested in Scotland will find much information in the following articles in these volumes:

OUTLINE AND QUESTIONS ON SCOTLAND

Outline

I. Location

(1) Latitude, 54° 38′ to 58° 41′ north
(2) Longitude, 1° 45′ 32″ to 6° 14′ west
(3) Relation to England
(4) Islands

II. Size

(1) Actual, 30,404 square miles
(2) Comparative

III. Surface and Drainage

(1) Northern Highlands
  (a) Grampian Hills
(2) Central plain
(3) Southern Uplands
(4) Broken coast line
(5) Rivers
(6) Lakes
(7) Scenic features

IV. Climate

(1) Influence of Gulf Stream
(2) Unequal distribution of rainfall

V. Industries and Resources

(1) Agriculture
  (a) Only one-sixth of land arable
  (b) Land system
  (c) Chief crops
(2) Stock raising
(3) Fisheries
(4) Minerals
  (a) Coal and iron
  (b) Other yields
(5) Manufacturing

VI. Transportation and Commerce

(1) Steam railways
(2) Tramways
(3) Water transportation
(4) Coastwise and foreign trade

VII. The People

(1) Physical characteristics
(2) Customs
(3) Distribution of population
(4) Education
(5) Religion
(6) Language and literature

VIII. Government and History

(1) Central government
(2) Local government
(3) History
  (a) "Caledonia"
  (b) The coming of the conquerors
  (c) Establishment of kingdom and struggle for independence
  (d) The Stuart kings
  (e) Era of religious struggles
  (f) Union with England

Questions

How does Scotland's largest river rank among the rivers of the British Isles as to volume?

What king figured in one of the most famous dramas ever written? Tell his story.

What and where are the *stacks*, and what form of life is to be found on them?

What island gave to Scotland its name and its Christianity?

How does the country compare in number of inhabitants with the American state and the Canadian provinces which it most closely resembles in size?

Who were the "Ladies of Hell," and why were they so called?

Name four writers whose works make up an important part of English literature, but who really belong to Scotland.

What and where is the loftiest peak in Great Britain? How high is it?

What part have the Cheviot Hills played in history and in literature?

Why has the western coast of Scotland a more temperate climate than the eastern coast?

What industry has been affected by the change in fuel in the British navy?

Who is the "popular hero of Scotland history," and what did he accomplish?

CITIES AND TOWNS

Aberdeen	Edinburgh
Ayr	Glasgow
Bannockburn	Gretna Green
Dundee	Leith
Dunfermline	Paisley

HILLS

Ben Nevis	Grampian
Cheviot	

HISTORY

Baliol, John De	James I (England)
Bannockburn	Knox, John
Bruce, Robert	Macbeth
Caledonia	Mary Stuart
Edward I, II and III (England)	Picts
England, subtitle *History of England*	Presbyterians
Great Britain, subtitle *History of Great Britain*	Wallace, William

ISLANDS

Hebrides	Shetland
Orkney	

LAKES

Katrine	Lomond

LEADING PRODUCTS

Cattle	Oats
Coal	Shale
Cod	Sheep
Fish	Ship
Iron	Steel

RIVERS

Clyde	Solway Firth
Forth	Tay

SCOTT, DUNCAN CAMPBELL (1862-), a Canadian poet and historical writer, one of the best known of contemporary Canadian men of letters. Scott was born at Ottawa, where he attended the public schools. Later he went to Stanstead Wesleyan College. In 1879 he entered the Dominion civil service as a clerk in the department of Indians, in which he was steadily promoted until, in 1914, he became deputy superintendent-general of the department. Scott's first volume of verses, *The Magic House,* appeared in 1893, and was followed at irregular intervals by *Labour and the Angel, New World Lyrics and Ballads, Lundy's Lane and Other Poems* and *Via Borealis. The Village of Viger* is a collection of ten short stories. Scott was one of the editors of *The Makers of Canada,* a series of historical biographies, and himself wrote the life of John Graves Simcoe in that series. Many of his poems and prose writings have appeared in Canadian and American periodicals.

SCOTT, FREDERICK GEORGE (1861-), a Canadian churchman and poet, best known for the volumes of verses called *The Hymn of Empire* and *My Lattice and Other Poems.* One of his latest works is a collection of poems, entitled *The Crown of Empire,* which were written at the front in the War of the Nations. Scott was at the front as senior chaplain of the first Canadian division, British Expeditionary Force (B. E. F.).

Scott was born at Montreal, attended the local high school, and later was graduated from Bishop's College, Lennoxville, and King's College, London. He was ordained deacon in 1884 and priest in 1886, in the latter year becoming curate of a small parish in Essex, England. In 1887 he was chosen rector at Drummondville, Quebec. After three years as curate of Saint Matthew's, at Quebec, he became rector in 1899. Scott's first published volume of verses was entitled *The Soul's Quest and Other Poems* (1888). Among his other works, in addition to the volumes already mentioned, are *Elton Hazlewood,* a story; *The Unnamed Lake, The Key of Life, Poems,* and various short stories.

SCOTT, HUGH LENOX (1853-), an American military officer who succeeded to the position of chief-of-staff of the United States army in 1914. He was born at Danville, Ky., and was educated at West Point, from which he was graduated in 1876. For several years thereafter he served in expeditions against the Indians. From the close of the Spanish-American War until 1903 Scott acted as adjutant-general of Cuba, and for the next three years was governor of the Sulu Islands (in the Philippines). From 1906 to 1910, having attained the rank of colonel, he acted as superintendent and commandant at West Point. In 1913 he was made brigadier-general and placed in command of a brigade of cavalry stationed along the Mexican border. He has a special talent for straightening out difficulties by means of diplomacy; in 1915 was successful in pacifying a lawless band of Piutes in Utah, and in 1916 was influential in dealing with the Villa faction in Mexico. In the latter year he was promoted to the rank of major-general. In 1917 he was appointed a member of the American commission to Russia, of which Elihu Root was

HUGH L. SCOTT

the head. General Scott is an ardent advocate of the principle of universal military service. In September, 1917, he reached the age limit for retirement.

SCOTT, Sir Richard William (1825-1913), a Canadian statesman, for half a century one of the leaders of the Liberal party. He served in the Ontario legislature, held office in the Mackenzie and the Laurier ministries, and was for thirty years the Liberal leader in the Dominion Senate. Sir Richard was born at Prescott, Ont., and was educated by a private tutor. Called to the Ontario bar in 1848, he soon became a leader in the profession at Ottawa. In 1852 he was elected mayor of that city and from 1857 to 1867 sat in the old Canada assembly. After Confederation he was elected to the first Ontario assembly, in which he sat for six years, being speaker in 1871. From 1872 to 1874 he was commissioner of crown lands for Ontario in the Blake administration.

When Alexander Mackenzie in 1874 formed his Dominion Cabinet, he included Scott as Secretary of State and Registrar-General. In the same year the Earl of Dufferin called Scott to the Senate, in which he spent the balance of his political life. In 1878, when the Liberals were defeated, Scott became leader of the Liberals in the Senate, a position which he did not relinquish until 1908, when he retired from public life. During the last twelve years of that period, 1896-1908, he was again Secretary of State, in the Laurier Ministry. Scott in 1878 carried through Parliament a Dominion Local Option law, generally known as the Scott Act or Scott Temperance Act. He was knighted in 1909.

SCOTT, Robert Falcon (1868-1912), a noted English explorer, who lost his life on the return journey from the South Pole, which he had set out to discover, but which had been reached a month earlier by Roald Amundsen. He was born at Outlands, Devonport, was educated at Stubbington House, Fareham, and in 1882 entered the navy. In 1889 he attained the rank of lieutenant, and in 1900 was made commander. In this latter year he undertook his first Antarctic expedition, and on returning, in 1904, was showered with honors. The rank of captain was conferred upon him, and in 1909 that of naval assistant to the second sea lord of the admiralty.

He had become absorbed in plans for Antarctic discovery, and in 1909 resigned from the navy and fitted out another expedition. Late in 1910 Scott sailed in the *Terra Nova* from New Zealand and reached the foot of Mount Erebus, where he had determined to set up his headquarters. During the summer of 1911 he established supply stations along his proposed route toward the Pole, and in November started with sledges over the ice. For part of the journey snowstorms and bad sledging made advance slow and difficult, but the party kept on, and as they neared their goal conditions grew more favorable.

ROBERT F. SCOTT
His name will always be associated with the history of south polar exploration.

On January 18, 1912 they reached the Pole, only to find that Amundsen had been before them in the discovery. Setting out on their return journey, the whole party of five died from privation and exposure. The *Terra Nova,* sent out in 1912 to bring the explorers home, carried back instead the tragic news.

The bodies, together with records and diaries kept by members of the party, were found in the tent which had been erected as their last camping place, and Scott's diary, written up to the day of his death, gave what he considered the causes of the disaster, and closed with an appeal to the public to provide for the families of himself and his companions. It was an appealing account of a tragedy which shocked the whole world. Near the place where he died a memorial has been erected.

Consult *Scott's Last Expedition,* written from his own records.

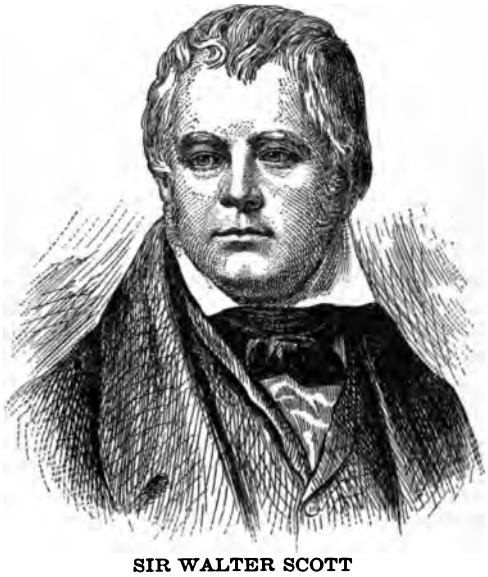
Related Subjects. The reader is referred to the following articles in these volumes:

Amundsen, Roald
Polar Exploration, subtitle *Antarctic Exploration*
Ross, James Clark
Shackleton, Sir Ernest Henry

SCOTT, Sir Walter (1771-1832), Scotch novelist and poet, born at Edinburgh, August 15, 1771. His father was a lawyer, a man with little of the adventurous spirit which distinguished the son; but among the ancestors of the family on both sides were border chieftains, tales of whose bold raids and marauding expeditions still lived in the countryside. Young Walter Scott never tired of hearing these accounts—indeed every one with whom he came in contact

was called upon to tell him stories. It was fortunate that he could find enjoyment in this way, for an illness when he was less than two years old left him lame and delicate and unable to play like other boys. He was sent to his grandfather's farm to regain his strength, and spent days listening to the stories his aunt read to him or lying in the fields, watched over by his grandfather's old shepherd. For a boy with an intense interest in all he saw about him, it was very hard to lie still and look at things from a distance, and gradually he began to drag himself about.

Strength came back to him, and by the time he was eight years old he was, except for his lameness, as robust as any of his fellows. Then he was sent to school, but he was behind other boys of his age, and consequently lost interest.



SIR WALTER SCOTT

By their vigor, their freshness, their rapid action, and their breezy, out-of-door atmosphere, Scott's novels attracted thousands of readers who else had known nothing of the delights of literature. He is, therefore, the greatest known factor in establishing and in popularizing that romantic element in prose and poetry which has been for a hundred years the chief characteristic of our literature. —LONG.

His record, therefore, was not always satisfactory, though his teachers admitted that he was unusually quick in comprehension. Like little Charles Dickens, however, he was in great demand among his schoolmates as a story-teller. He took a large part, too, in the sports of the school, and the little sketch which he wrote years later of his boyhood days tells of exciting mock battles which the schoolboys had with the boys of the town. Through it all he kept his fondness for romantic tales and poems, and before he was ten years old began making a collection of books on such subjects. The finding of Percy's *Reliques of Ancient English Poetry* was an epoch in his life and exercised a distinct influence on his literary activity.

The Practice of Law. Two years at the University of Edinburgh added nothing to his reputation as a student, though when his interest was once aroused no work was too hard for him. Thus he mastered French, Italian and German, that he might read the romantic literature in those tongues. His father had determined that the son was to follow the legal profession, and though he had no great liking for it, he applied himself with diligence to the work in his father's office and later entered law classes at the University of Edinburgh. In 1792 he was called to the bar. During his days of apprenticeship he took trips about the country, finding especial delight in old battle fields, ruins and other places with historical association. The fact that Scott thus steeped himself in the literature of romance and acquainted himself thoroughly with the historic backgrounds of happenings in his own country accounts in part for the wonderful speed with which he later produced his great works.

Scott's law practice, while never large, was promising enough to warrant him in marrying Charlotte Charpentier, in 1797, and the young couple divided their time between Edinburgh and the suburb of Lasswade. An appointment as sheriff of Selkirkshire in 1799 and as a clerk of the Court of Sessions some years later assured him an income, so that he was able to give up the law and devote himself to literature.

Beginning of Literary Career. The first work which appeared under his name was a translation, in 1796, from the German of Bürger's *Lenore* and *The Wild Huntsman,* followed three years later by an English version of Goethe's *Götz von Berlichingen.* Meanwhile, he had tried his hand at poetry, and produced the fine ballads of *Glenfinlas,* the *Eve of Saint John* and *Grey Brother.* For years he had been collecting Scottish border poetry, and the results of his work were published in 1802 and 1803 as *Minstrelsy of the Scottish Border,* which won him wide and favorable notice. In 1805 appeared his first original work of note—the long poem called *The Lay of the Last Minstrel.* Its popularity was immediate and great, and Scott might almost have said, like Byron, that he "woke one morning and found himself fa-

mous." *Marmion* followed, and was even more enthusiastically received; the swinging lines, as one biographer has said, "took possession of the public like a kind of madness;—people could not help spouting them in solitary places and muttering them as they walked about the streets." Scott himself was astonished at his success, which was repeated in 1810 on the publication of *The Lady of the Lake*, which drew crowds of tourists to the scenes it described and raised the post-horse duty in Scotland.

In 1804 Scott removed from Lasswade to the banks of the Tweed, where seven years later he bought a farm of one hundred acres, with an

ABBOTSFORD, THE "ROMANCE IN STONE"

unpretentious cottage. From year to year, as his income warranted, he bought more land, and little by little built up the magnificent castle of Abbotsford, "the romance in stone" which was the pride of the countryside. Not until 1824 was it finished. Scott showed the keenest interest in every phase of its progress and delighted particularly in the library, with its carved oak ceiling and thousands upon thousands of books, and the armory, with its notable collection of weapons.

Abandoned Poetic Form. Scott had felt that poetry was not for him the only possible mode of expression, and as early as 1806 started *Waverley*, which, however, he laid aside. As he began to realize that the poems which followed the *Lady of the Lake* were diminishing rather than increasing his fame, he determined to return to the prose romance, strengthened in his purpose by the fact that Byron was surpassing him in his own field in poetry. In 1814 *Waverley* appeared anonymously, and the earlier success of the poetry was duplicated. The "Great Unknown" was discussed on all sides, and although before long the secret became an open one, it was not until 1827 that Scott formally acknowledged the authorship. In incredibly rapid succession appeared the volumes in the long series of Waverley Novels, two often appearing in one year. Indeed, even to those who were practically certain that they were from Scott's pen, it seemed impossible that he could produce them, at the same time tending to his official duties, playing the gracious host to the constant stream of visitors at Abbotsford and writing the things which were at this same time appearing under his own name. Among these novels the most noteworthy were perhaps *Guy Mannering, The Heart of Midlothian, The Bride of Lammermoor, Ivanhoe, Kenilworth, Quentin Durward* and *The Talisman*, though to lovers of Scott no one of all the volumes is without its peculiar interest and charm.

Struggle Against Financial Difficulties. In 1820 Scott's fortune seemed assured. The sales of his books amounted to at least $50,000 a year, he was sought after by the notable and the wealthy, and he had just been created a baronet. His good fortune, however, was built

on an insecure foundation. Years before he had become a silent partner in the printing firm of James Ballantyne & Company, and more than once he had been called upon to rescue it from misfortune. In 1826 the failure of the great publishing business of Constable & Company brought Scott's firm into bankruptcy, the amount of indebtedness being about $600,000. The Ballantynes withdrew, and the creditors themselves offered compromise; but Scott's sense of honor caused him to assume the whole vast sum as a personal debt. "Time and I," he declared, "against any two;" and again, "If I live and retain my health, no man shall lose a penny by me." The struggle that followed was heroic, and Scott's facility in composition stood him in good stead. *Woodstock, The Fair Maid of Perth, Anne of Geierstein,* a *Life of Napoleon* in nine volumes, four volumes of historical sketches known as *Tales of a Grandfather,* were but a part of what came from his pen between 1826 and 1831. Friends and the public stood by him, and the new edition of his novels sold rapidly. Within two years from the date of the crash he had paid to his creditors nearly $200,000, and it seemed as if he might in time free himself from the debt. His health broke under the strain, however, and at length he consented to try a change of air. The government placed a vessel at his disposal, and he cruised about the Mediterranean, stopping at Naples and at Malta. It was in vain, and he begged to be taken back to Abbotsford before he died. His mind had partially failed after several paralytic strokes, and he came to believe firmly that the last of his debts had been paid. Happy in this belief he died, on September 21, 1832. He was buried at Dryburgh Abbey, where his wife had been laid six years before. In 1847 all of his voluntarily assumed obligations were paid off by the sale of copyrights, and his name was left as free as he himself would have had it.

Estimate of the Novelist. As in Scott's boyhood his playmates gathered round him and made him the center in their games, so in his manhood he drew to him all who knew him. His sunny, genial nature, his unfailing kindliness, the simplicity with which he bore his honors, made him one of the most attractive figures in all literary history. The crowds which visited him at Abbotsford often intruded on his time, but never did they find him other than courteous. And the influence which comes from his works is as strong and as wholesome as that from his life. While his poems have not kept the immense popularity which they had in their own day, they are still read widely and with pleasure for the stories they tell, the pictures they present and their constant movement. Occasionally, too, in his little lyrics, Scott reaches a great height. His novels are read perhaps more than those of any other author, and the modern tendency toward historical fiction may be traced largely to their influence. A.MC C.

There are several biographies of Scott, but that written by his son-in-law, Lockhart, is easily the best. Indeed, it ranks with Boswell's *Life of Johnson* as one of the greatest biographies in English. Consult, also, Jenks' *In the Days of Scott;* Stevenson's *Memories and Portraits.*

SCOTT, WALTER (1867-), a Canadian journalist and statesman, for a generation one of the best known men in the Canadian Northwest, and for many years the foremost Liberal in politics. It was in 1892, as part owner of the Regina *Standard,* that Scott first came into prominence. He was a native of Middlesex County, Ontario, but went west in early manhood and eventually settled in Regina. In 1894 he assumed the ownership and editorship of the Moose Jaw *Times,* which he relinquished after a year for the Regina *Leader.* Since 1900 the two papers have been under his control.

Previous to 1906 Scott combined political life with journalism. In 1900 and 1904 he was elected Liberal member of the House of Commons for Assiniboia West. In Parliament he was conspicuous in the negotiations which led to the organization of the provinces of Alberta and Saskatchewan. In 1905 he resigned from the Commons to become first premier of Saskatchewan; from 1905 to 1912 he was also minister of public works, and thereafter until 1916 minister of education. In 1916 ill health compelled him to resign the premiership, although he remained in the provincial assembly as a private member. The last years of his premiership were disturbed by the temperance agitation and by corruption in the Liberal party. Scott at first opposed the temperance movement, but later realized its strength and in 1915 took steps in the direction desired by the reformers by ordering all bars in the province closed after seven o'clock at night, and by other measures with temperance as their end. In 1916 the speaker of the assembly and several other members were involved in charges of bribery by the liquor interests and of misappropriation of funds intended for railway subsidies. Scott was personally absolved from all blame,

but the incident was not without its effect on his party's popularity.

SCOTT, WINFIELD (1786-1866), an American soldier who distinguished himself in active service in the War of 1812 and the Mexican War, and who was kept from fighting in the War of Secession only by his advanced age. Scott was born at Petersburg, Va. Though educated for the law he entered the army in early manhood, and upon the outbreak of the War of 1812 was commissioned lieutenant-colonel and went to the Canadian border. At the Battle of Queenstown Heights he was taken prisoner, but was later exchanged, and in 1814 fought at Chippewa and at Lundy's Lane. At the close of the war Congress conferred upon him the rank of major-general. Scott's next service was the preparation of the first complete manual of military tactics ever compiled for the United States army. During the next few years he was active in Indian affairs, and in 1841 succeeded General Macomb as commander of the army.

WINFIELD SCOTT
He fought in two wars, was commander of the United States army, and was prevented only by age from serving in a third great war.

Then came the war with Mexico. In the spring of 1847 Scott took chief command in the enemy's territory, and when the war closed he had to his credit the victories of Vera Cruz, Cerro Gordo, Contreras, Churubusco, Molino del Rey and Chapultepec, and the capture of Mexico City (see MEXICAN WAR). Though "Old Fuss and Feathers" as he was affectionately called by his men, returned from the war a national hero, he was defeated for President in the campaign of 1852, in which he headed the Whig ticket. Congress revived the rank of lieutenant-general for him in 1855, and it was conferred upon him by brevet. In 1861 he retired from active service, and five years later died at West Point. A two-volume autobiography was published by him in 1864.

SCOTTI, *skot'e,* ANTONIO (1866-), an Italian basso whose excellent voice and high talents as an actor have brought him into the front rank of operatic stars. He was born in Naples. At the age of twenty-three he made his first appearance in grand opera at Malta, playing the rôle of Amonasro in *Aïda.* His début gave promise of future greatness which later tours in Europe and America abundantly fulfilled. In 1899 he sang for the first time in the Metropolitan Opera House, New York, and thereafter appeared regularly with the Metropolitan organization. His repertory includes *Don Giovanni, Faust, Othello, La Tosca* and *Il Pagliacci,* his finest work being done in Mozart's *Don Giovanni.*

ANTONIO SCOTTI

SCRANTON, *skran'tun,* PA., the county seat of Lackawanna County, is the third largest city in the state, ranking next to Philadelphia and Pittsburgh. Its population, which was 129,867 in 1910, had increased to 146,811 (Federal estimate) in 1916. Scranton is located in a valley of the Alleghany Mountains, at the mouth of Roaring Creek on the Lackawanna River, and in the northeastern part of the state, eighteen miles northeast of Wilkes-Barre and 134 miles northwest of New York City. It is on the Central of New Jersey, the Delaware, Lackawanna & Western, the Delaware & Hudson, the Erie and the New York, Ontario & Western railroads.

Scranton occupies an area of nearly twenty square miles on an undulating plateau averaging 800 feet above the sea. Some of the hills in the vicinity rise more than 1,000 feet higher. The surrounding region is rich in anthracite coal; the shipping of coal and the manufacture of heavy hardware and of textiles are the city's chief industries. Local estimates report an annual output of twenty million tons of coal from within a radius of ten miles of the city, a production worth fifty-four million dollars. The coal industry gives employment to about 45,000 men. The principal articles manufactured are nuts and bolts, foundry products, locomotive and stationary engines, knit goods, buttons, lace curtains and silk.

Nay Aug Park (ninety acres), situated among hills in the eastern part of the city, has, among other attractions, a fine swimming lake and bath houses and the Everhart Museum of Natural History. Adjoining Nay Aug is Luna

Park. Near the city in the surrounding hills are various lake resorts. Prominent features of Scranton are the Federal building, the courthouse, standing in the center of a parked square, a fine city hall, Albright Memorial Library, the administration buildings of the International Correspondence Schools, Y. M. C. A. and Y. W. C. A. buildings, Masonic Temple, several fine hotels and the new Delaware, Lackawanna & Western Passenger Station. Benevolent institutions include the Moses Taylor and state hospitals, the Oral School for the Deaf and Dumb and the Home of the Friendless. In addition to several private educational institutions the city has an Historical Society and a Society of Natural Science.

Scranton was founded in 1840 by Joseph H. and George W. Scranton. In 1854 it was incorporated as a borough and in 1866 and 1901, respectively, was incorporated as a third- and a second-class city.

SCREW, a mechanical device consisting of a cylinder with a spiral projection or ridge on its surface. The projection is called the *thread* and the cylinder the *body* of the screw. Cut from paper a right-angled triangle with an altitude at least three times the length of the base. Draw a heavy line along the edge of the oblique side of the triangle (its hypotenuse), and then roll the paper around a pencil, beginning at the wide end (see 1, in Fig. 1). The dark line around the pencil corresponds to the thread of the screw. In 2 of Fig. 1 is shown a section of the projecting spiral. The vertical distance (*s*) between two whorls of the thread is known as the *pitch*. The screw works in a nut having a spiral groove into which the thread of the cylinder fits, and the power is usually applied by a lever or a wheel which moves through the circumference of a circle. The power, it should be understood, is applied at the end of the lever.

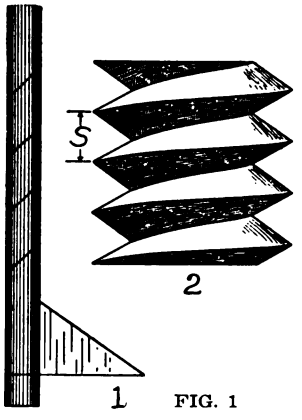


FIG. 1

(1) The screw is a spiral inclined plane. (2) The *pitch* of the screw is shown at *s*.

The mechanical advantage of the screw is stated thus:

With the screw a given power will support a weight as many times as great as itself as the circumference described by the power is times as great as the pitch of the screw.

A complete revolution of the screw raises the weight a distance equal to the pitch. A screw having five threads to the inch has a pitch of one-fifth inch.

Application. To ascertain the weight that can be raised by a screw through the force of a given power, multiply the power by the circumference of the circle which it describes, and multiply this product by the denominator of the fraction representing the pitch. (The circumference of a circle= 2×the radius×3.1416.) What weight can be raised by a power of 20 pounds, acting upon a lever 5 feet long and attached to a screw having a pitch of ⅕ of an inch? The power moves through a circle whose circumference=3.1416×2×5 feet or 31.416 feet. 31.416×12=376.992, number of inches. 376.992 ×20=7539.84. 7539.84×5 (denominator of fraction representing the pitch)=37,699.2. Therefore a weight of 37,699.2 pounds can be raised by the screw. (This is the theoretical result. Practically, the result is somewhat less because of the power used in overcoming friction.)

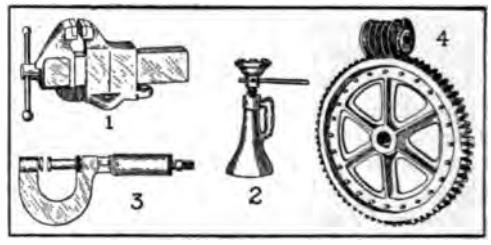


FIG. 2

(1) Vise; (2) jackscrew; (3) micrometer screw (see page 3791); (4) worm wheel.

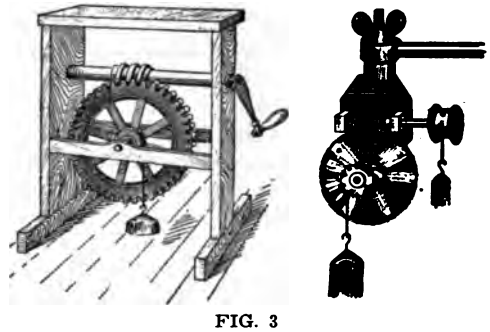


FIG. 3

Two forms of endless screws.

Uses. The screw is applied to so many uses that to name them all would be impracticable. We are all familiar with the wood screw used

by carpenters, and with the screw on the end of bolts. Nearly all vises (1, in Fig. 2) are opened and closed by a screw. The jackscrew (2) is used for raising buildings. The micrometer (3) measures minute distances by means of a screw having a very fine thread. The head of the micrometer screw is usually divided into hundredths, so that a hundredth of the interval can be measured.

Endless Screw. An endless screw consists of a thread on an axle that meshes into the teeth of a wheel. Such a device is sometimes called a *worm wheel* (4). Fig. 3 shows how the worm wheel may be used for raising heavy weights.

SCRIBE, *skreeb,* AUGUSTIN EUGÈNE (1791-1861), a French dramatist, born in Paris. He was educated for the law, but his tastes were literary, and he soon began to write for the stage. After early successes he undertook work in collaboration with other writers, and the result of this method was an extraordinarily large number of every type of drama—comedy, tragedy, vaudeville sketch and opera libretto—ascribed to his pen, to the number of over 400. He chose his characters from the middle classes and selected themes that were highly interesting and popular. Another reason for his great success lay in his thorough knowledge of dramatic construction; he was master of the technique of the stage, and later dramatists learned much from him. In 1836 he was made a member of the French Academy.

Scribe will always be best known for his librettos of *Fra Diavolo* and the *Huguenots,* two operas whose popularity will not wane. Other productions from his pen are now but little known; among these are *Robert, the Devil, Valérie* and *Adrienne Lecouvreur.*

SCRIBES, *skrybz,* a class of learned Hebrews who were required to copy the Scriptures, expound and interpret the law and keep the official documents of the kingdom. The earliest scribes were priests (see EZRA), but in later times this was not the rule. Most of the scribes belonged to the party of Pharisees and they constituted the scholarly leaders of that body. In *Matthew* XXIII, 14 and 25, Christ is recorded as rebuking the scribes and Pharisees for their hypocrisy. See PHARISEES.

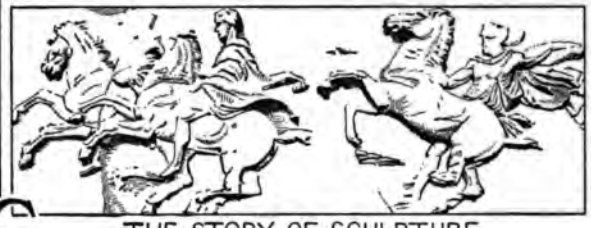
SCROFULA, *skrof'u la,* a form of tuberculosis which is characterized by swelling of the lymph glands and by poor nutrition of the tissues. Usually the glands in the neck are affected, but the infection may occur in any lymphatic gland, and in many cases abscesses form in the swollen parts. The best course of treatment is that which is based on a recognition of the value of fresh air, nutritious food and warm and suitable clothing. Physicians generally prescribe cod-liver oil and similar tonics, and the glands are sometimes painted with iodine to reduce swelling; a local operation may be necessary in case of abscess.

In England scrofula was formerly called *the king's evil,* because it was believed that a victim could be healed if his sovereign touched him. There is a well-founded story that Samuel Johnson at the age of three was taken to London to be touched by Queen Anne. The practice is supposed to have originated with Edward the Confessor. See TUBERCULOSIS.

SCRUPLE, *skru'p'l,* a measure of weight used only by apothecaries. It is one-third of a dram, one-twenty-fourth of an ounce and one-two-hundred eighty-eighth part of a pound, and is equivalent to twenty grains (see table on page 1765, under DENOMINATE NUMBERS). The word is from the Latin *scrupus,* meaning a *sharp stone* and, figuratively, *uneasiness of the mind.* The word is also used in English to mean *reluctance* or *hesitation.*

SCUDDER, *skud'er,* HORACE ELISHA (1838-1902), an American author and editor, born in Boston and educated at Williams College. After his graduation in 1858 he taught school for three years in New York City, then entered business life, but soon withdrew to devote himself to literature. From 1890 to 1898 he edited the *Atlantic Monthly;* he wrote a sympathetic and important life of James Russell Lowell, edited the "American Commonwealths" series, and published various historical and biographical works, among which are *Noah Webster, A History of the United States, George Washington* and *Men and Letters.* Best known of his writings, however, are his works for children, which include *Seven Little People and Their Friends* and *The Bodley Books.*

SCULPIN, *skul'pin,* a group of oddly-shaped fish consisting of about 250 species, found chiefly around the rocky coasts in regions of the north. Their flesh is too coarse to be of much food value, but is eaten by peoples in the Arctic regions. The typical sculpin has a club-shaped body, spiny fins, large, grotesque mouth, and skin covered with warty projections. These fish prey upon small sea animals and are voracious eaters, often stealing the bait of anglers. They are themselves preyed upon by larger fish. Several names are applied to them locally, such as *miller's thumb, Irish lord* and *sea raven.*



THE STORY OF SCULPTURE

SCULPTURE, *skulp'ture*. Among the arts of design three stand out preëminently — architecture, sculpture and painting. Architecture and sculpture, which preceded painting in point of time, had their origin in a far-distant period of the world's history, and in its primitive stages sculpture was a handmaid of the art of building. Primitive man first sought security from storms and attacks of wild beasts; then he turned his attention to the adornment of his rude habitation. Thus, in the caverns, lake dwellings and other abodes of prehistoric times appeared carvings on bones, stones and walls— the crude beginnings of what was to be one of the noblest of the arts. In the course of its development sculpture became the special medium for the portrayal of the human figure. A French critic has said:

"After admiring the universe man began to contemplate himself; he realized that the human form is adapted to the spirit; that its proportions, its symmetry, its ease of motion, its superior beauty, render it alone, of all living forms, capable of fully manifesting thought. Therefore he copies the human body, and sculpture is born."

Processes. While we are accustomed to think of the sculptor as one who hews a statue out of a block of marble, the actual work of the artist is quite different. Before the work in stone can be done a clay model must be made, and this model must be cast in plaster. The whole process is very interesting. The artist usually models a small figure of the statue to serve as a pattern. Then he reproduces this on a large scale, molding the clay on an iron framework of the required size. When the clay model is completed plaster of Paris is poured over the figure to a depth of two or three inches, and allowed to "set." Then the artist removes the clay, leaving what is called the "waste mold." Plaster of Paris is then poured into the mold, and when the plaster has hardened the waste mold is carefully clipped away. Thus a cast of the figure is obtained. In many instances different portions of the statue are cast separately, a practice known as *piece molding*.

The reproduction of the cast in marble is the next step. Usually the block of marble and the model are placed near each other upon pedestals. By means of an accurate pointing machine and other devices the important points of depression in the model are marked on the block and holes are drilled in the stone. Finally a skilled stonecutter hews the marble away according to the position of the holes, and the statue is ready for finishing touches. The finishing is done by the sculptor, but this is only a small feature of the work. In fact, many modern sculptors know little about actual carving in marble. It is known, however, that Michelangelo, whose supremacy in sculpture is unquestioned, hewed his creations from the marble block without the aid of a cast model, and this was also the custom of the earliest sculptors of antiquity.

Sculpture in bronze involves other processes. The colossal *Statue of Liberty* in New York Harbor is an example of the *repoussé* process, in which thin sheets of bronze are beaten into the desired shapes and fastened to a framework, or core. Statues are often cast in bronze by the following process: A core of fireproof material is made, having the shape of the intended figure, but made on a slightly smaller scale. A coating of wax is applied to this, and in it the details are worked out. Then a coating of fireproof material is applied, to serve as a mold, the core and outer coating being fastened together with bronze pins. Next, the figure is heated until the outer coating hardens and the wax melts and runs out of holes at the bottom.

Molten bronze is then poured in, filling the space formerly occupied by the wax, and when the metal has hardened the mold and core are removed, leaving a hollow metal statue, perfect in every detail.

The figures so far considered are examples of sculpture *in the round*. Figures are also carved upon a solid surface, so as to project from it, and are said to be *in relief* (see RELIEF).

History of Sculpture

Egypt. It was in the valley of the Nile that sculpture first developed as a fine art. It is an interesting fact that in all other nations sculpture was in the beginning conventional, and later became free and natural, while in Egypt the reverse is true. The earliest forms of this art, reliefs in the tombs of the dead, are realistic portrayals of the daily life of the deceased and his family, or pictures of life after death. Statues in the round were also produced in the early period, and these have a freedom and a naturalness that make them comparable to Greek works of a later date.

As Egyptian sculpture developed it came under the influence of the priests, and the colossal figures of gods and kings, typical of the art in the height of its development, represent certain fixed conventions and limitations. The figures seem to belong to a "world of the tomb, one which never was alive." Yet they have a grandeur and dignity that make them very impressive. In the underground temple tombs of Abu-Simbel there are statues ranging from sixty to ninety feet in height. The Egyptian artists worked in marble, black, gray and red granite, basalt, limestone, bronze, wood, porcelain, ivory and many other substances, and the skill exhibited in the carving and finishing of hard materials indicates that they used very ingenious tools. The most remarkable monument of ancient Egyptian sculpture is the Sphinx at Gizeh, a huge figure with the head of a human being and the body of a lion. Nearly all statues, except those carved from colored material, were painted. For illustrations of Egyptian sculpture see page 1971 in the article EGYPT, and page 3070, under ISIS.

Assyria. See ASSYRIA, subhead *Art*.

Greece. While the earliest examples of sculpture in Greece indicate the influence of Oriental ideals, in its development this branch of Greek art bears out forcibly the saying that the "Greeks did not originate art but they invented beauty." There was not only a complete breaking away from Oriental tendencies, but an independent development in which sculpture reached the greatest heights it has ever attained. The first period of Greek sculpture, sometimes called the *Archaic*, lasted until the end of the Persian Wars, or about 480 B.C. From about 700 B.C. to 500 B.C. there was a formative era, in which the artists were gaining control of their materials, and definite schools were being established. The statues of this era are stiff and conventional, and many of them are draped. Following this era there was a period of development, in which the sculptor worked towards a freer, more natural expression of his ideal.

PAN
Statue in the Pitti Palace, Florence.

Then came the Persian Wars, the victorious outcome of which was a wonderful stimulus to the creative forces of the Greeks. As Athens, in Attica, was the center of the finest achievements in sculpture, the period of glory (480 B.C.-323 B.C.) is known as the *Attic Period*. Greek sculpture in Athens came into full splendor under the inspiration of the great statesman Pericles (which see), with whose name is always linked that of the supreme genius of ancient sculpture—Phidias. There was, however, a transitional period in which sculptors all over the Greek world were giving expression to that love for physical beauty which was stimulated by contemplation of the noble athletes competing in the national games. To this period belongs Myron, sculptor of the celebrated bronze *Discobolus*, or *Discus Thrower* (see illustration on page 1803).

Under the rule of Pericles Athens became a city of noble temples adorned with statues of the gods. Phidias not only designed the famous frieze for the Parthenon (see illustration at the

head of this article) but he executed a colossal statue of Athene for that temple, and one of Zeus for the temple at Olympia. The latter, a gold and ivory monument sixty feet high, was one of the Seven Wonders of the Ancient World. Phidias had several contemporaries of outstanding importance, including Polycletus of Argos, whose masterpiece was a statue of Hera, and Paeonius, of Mende, sculptor of a famous *Nike,* or *Victory,* set up at Olympia.

The sculptors of the age of Phidias idealized their subjects, giving expression in their work to a lofty religious aspiration. In the century following, which produced the so-called Later Attic School, the artists were more interested in individual traits of character, and sculpture became less heroic and more human. Portrait busts of living men were produced, and the statues of the gods revealed these divinities in their individual moods. That is, there was a decided tendency toward realism and a drift from idealization. The two greatest figures of this school were Scopas and Praxiteles. Scopas was one of the sculptors who assisted in the adornment of the Mausoleum at Halicarnassus, one of the Seven Wonders of the World (see illustration on page 3680).

The single undoubted original known to be the work of Praxiteles is a *Hermes* group discovered at Olympia in 1877. This priceless treasure is preserved in the museum at Olympia. Praxiteles, who is said to have "rendered into stone the moods of the soul," was also the creator of a matchless *Aphrodite,* set up in the temple to the goddess at Cnidus. The so-called *Venus de Medici,* in the Uffizi Gallery at Florence, is believed to be a copy of the Cnidian *Aphrodite.* The last Greek artist of whom we have any considerable knowledge, Lysippus of Sicyon (in Sicily), lived in the last half of the fourth century. He is not properly a representative of the Attic School, though he was greatly influenced by its traditions. Lysippus was celebrated for his works in bronze, especially his statues and portrait busts of Alexander the Great, and he was the leader of a school of art which adopted a new system of bodily proportions—small head, long legs and slender figure.

The death of Alexander the Great (323 B. C.) marks the end of the Attic Period and the beginning of the Hellenistic, during which Greek culture was diffused over the lands in Asia and Egypt conquered by Alexander. This period ends with the conquest of Greece by Rome, in 146 B. C. Rhodes, the chief city of an island of the same name in the Eastern Mediterranean, and Pergamus, a city in Western Asia Minor, were centers of important schools of sculpture during the Hellenistic Period. The former produced the celebrated *Colossus of Rhodes,* a figure of the sun god astride the entrance to the harbor of the city; the *Laocoön* group (see illustration on page 3330); and the *Farnese Bull* (see FARNESE). To the Pergamene school belongs the bronze original of the famous *Dying Gaul,* a copy of which is preserved in the Capitoline Museum, Rome. The Hellenistic Period also produced two famous statues, both of which show the influence of the Attic School. These, the *Nike* (Winged Victory) *of Samothrace* and the *Venus de Milo,* are pictured in the panel at the head of this article.

Italy. *The Roman Period.* Towards the end of the Republic, in the first century before Christ, an independent school of Roman Sculpture began to take form, but for some time before this the Romans had relied on Greece for the adornment of their temples and other buildings. During their career of conquering the Hellenic world they had borne away as trophies of victory numerous statues and bas-reliefs taken from Grecian temples, and Greek sculptors in large numbers flocked to Rome after the conquest of their country. During the early Empire, however, Roman artists produced some very commendable historic bas-reliefs and portrait statues, which were more than mere imitations of Greek models. The bust portraiture of the Romans had a realism and vitality which the Greeks rarely attained, and this realistic tendency was also manifest in their historic sculptures, such as the decorations on the Arch of Titus and those on the columns of Trajan and Marcus Aurelius. Mythological statuary, however, was inspired chiefly by Greek ideals and traditions. In the second century A. D. Roman sculpture entered upon a decline, and when Christianity became the state religion it deteriorated into a form of architectural decoration and lost all tendency to realism.

MARS RESTING
A statue in the Villa Ludovisi, Rome.

Revival of Sculpture. During the thirteenth century sculpture experienced a rebirth in Italy, and it was this revival that paved the way for the splendid achievements of the Renaissance. The leader in this movement was Nicola Pisano (1210-1298). His greatest masterpiece was a six-sided marble pulpit in the baptistery at Pisa, which he adorned with bas-reliefs representing scenes from the life of Christ. His son Giovanni also won distinction in the revival of art. He was the founder of the school of Italian Gothic sculpture, which emphasized dramatic expression rather than classic beauty, the elder Pisano's ideal. This early period also produced Andrea Pisano (1270-1348), carver of the reliefs on Giotto's Campanile at Florence; and Andrea Orcagna (died 1368), whose masterpiece was the tabernacle at Or San Michele, probably the most beautiful example of Gothic art in Italy.

The Renaissance. One of the great masters of the Early Renaissance was Lorenzo Ghiberti (1378-1455), famed for his wonderful bronze doors in the baptistery at Florence. Michelangelo said of them that they were worthy to be the gates of Paradise. Donatello (1386-1466), Lorenzo's contemporary, was the greatest genius of this era, and his influence dominated Italian sculpture until the High Renaissance, which culminated in Michelangelo. A third great name of the Early Renaissance is that of Luca della Robbia, who worked in terra cotta, marble and bronze. Sculpture through these masters and their followers advanced in naturalness, beauty of form, composition and technique.

High Renaissance. It is characteristic of Italian sculpture of this period that there was no distinctly national school, but there were many schools, each centered in a special city. Siena, Padua, Venice and Florence were all centers of activity, but it was the Florentine school that produced the crowning figure of this golden age of Italian sculpture. What Shakespeare was to the Elizabethan drama, Michelangelo (1475-1564) was to the sculpture of his day. In him all previous efforts to interpret passion and feeling were summed up and concluded; he was not only supreme as a sculptor, but as a painter and architect, and his influence on modern art cannot be overestimated. His colossal *David* at Florence, the *Captives* in the Louvre, the *Moses,* in Rome (see illustration on page 3963), the statues in the chapel of the Medici at Florence, and the *Madonna,* in Bruges, are at once monuments to his individual genius and to the greatness of the period. His immediate successors, with one exception, were too much given to the imitation and exaggeration of his manner to achieve anything more than mediocrity; this exception was Benvenuto Cellini (1500-1571), noted not only for his work in bronze, but for his skill as a goldsmith. Italian sculpture of the seventeenth century culminated in Lorenzo Bernini (1598-1680), noted for his *Apollo and Daphne.* His death marks the last effort to keep Italian sculpture alive. He was the master of the "barocco" style, which aimed at elegance and grace at a sacrifice of purity of ideas. Then the art declined until Canova (1757-1822) brought new life to it.

NEPTUNE
With his symbol, the trident. [From a statue in the Lateran Museum, Rome.]

Modern Italian Sculpture. In the eighteenth century Italy again became the center of the classical revival which spread thence throughout Europe. The result was the rise of a style based upon a return to Greek ideals. Canova was the first to give expression to this new conception; his *Cupid and Psyche* and *Pauline Borghese* are good examples of his art, which was characterized by imagination and grace, but somewhat lacking in the emotional element. His followers were close imitators. Only that which was strictly after the antique was admitted into the Italian academies, and art degenerated into a cold conventionalism which was dominant until Lorenzo Bartolini (1777-1850) initiated the newer Florentine naturalistic school. The later nineteenth century Italians, with the exception of Consani, Albani and Fedi, drifted toward a naturalism which tended to become a debased realism.

France. The rise of an independent school of sculpture in France dates from the early sixteenth century, when the Italian Renaissance began to exert its influence upon all Europe. About this time Tours was the foremost art center in France, and Michel Colombe (1431-1514) was the founder of its school of sculpture. Francis I, the Renaissance king of France, used his influence to build up a school of French sculpture; among the noted sculptors whom he

appointed to execute great decorative works was Jean Goujon (1520-1572), whose art is best represented by his *Fountain of the Innocents* in Paris. One of the first acts of Louis XIV was to commence the building of the Palace of Versailles. Pierre Puget (1622-1694) executed numerous sculptures for this wonderful palace, as well as decorations for many public buildings of Paris, while Francis Girardon (1628-1715) acted as chief inspector of sculpture at Versailles under Lebrun.

ROMAN GLADIATOR
A statue by Agasias of Ephesus (second century B.C.), known as the Borghese Gladiator; in the Louvre, Paris.

The seventeenth century had favored great decorative sculptures, but in the eighteenth century there was a tendency toward single-figured statues. Among the great artists that developed were Jean Antoine Houdon (1741-1828), a famous portrait sculptor; Joseph Bosio (1769-1845), whose bronze quadriga (two-wheeled chariot with four horses abreast) surmounts the triumphal arch of the Place du Carrousel in Paris; and François Rude (1785-1855), who absorbed the patriotic spirit of the Revolution and expressed it in his *The Marseillaise,* the great bas-relief on the Arch of Triumph in Paris. The effects of the Romantic Movement left their impress upon the nineteenth-century French sculptors, among whom were Antoine Barye (1795-1875), sculptor of wild animals; and Jean Baptiste Carpeaux (1827-1875), creator of numerous portrait busts and sculptures on the New Opera House in Paris. By far the greatest figure in modern French sculpture is Auguste Rodin, a zealous advocate of the idea that Nature alone should be the artist's source of inspiration. He is one of the greatest realists who ever lived.

Germany. Germany slightly preceded France in point of time in the development of a national Renaissance style. Adam Krafft (1480-1507) of Nuremberg, a center of the so-called Franconian school, did much to raise the art of sculpture in stone to a high standard of excellence. His friend and countryman, Peter Vischer (1455-1529), turned his attention to casting in metal, and became famous as a bronze worker. Albrecht Dürer (1471-1528) was noted both as a sculptor and painter. Then came the devastating Thirty Years' War, and the history of sculpture was a blank for many years.

The modern school of sculpture in Germany can be traced to the influence of Thorwaldsen, the Dane, a disciple of classical art. The first exponent of the classical revival in Germany was Johann Dannecker (1758-1841). He was followed by John G. Schadow (1764-1850) and Christian Rauch (1777-1857); the latter's masterpiece is his statue of Frederick the Great in Berlin. He was the founder of the Berlin school of sculpture, and his work shows a harmonious blending of naturalism and idealism. Others who worked along similar lines were Ernest Rietschel (1804-1861), Friedrich Drake (1805-1882) and August Kiss (1802-1865). Among sculptors of recent fame are Begas, Wolff, Hildebrand and Schilling.

England. This country for many centuries gave little encouragement to those who labored with marble and bronze. Of the Renaissance sculpture very little is extant, and it was not until the reign of Charles I that any great progress was made. The first noted sculptor of this time was Nicholas Stone (1586-1647), whose fine tombs at Westminster Abbey show a tendency toward higher art. Thomas Banks (1735-1805) is regarded as the father of ideal English sculpture, though he was unappreciated in his day. John Flaxman (1755-1826) brought the classical spirit into English art and founded the school of the nineteenth century. His *Saint Michael Overcoming Satan* and *Apollo* show how nearly he approached the spirit of sculpture of Greece. For fifty years after Flaxman the English sculptors were swayed by Canova's art. John Gibson (1791-1866), the most popular of Canova's English pupils, is best known through his *Narcissus, Psyche Borne by Zephyrs* and *Hylas Surprised.* John H. Foley (1818-1874) and Patrick MacDowell (1799-1870) were the last great representatives of the classical school.

Alfred Stevens (1817-1875) was one of the first disciples of the modern school of naturalism. He executed the finest decorative sculpture in England, the *Monument of the Duke of Wellington,* in Saint Paul's Cathedral. But the leaders of this movement were two famous

painters, Frederick Leighton (1830-1896), whose *Athlete Struggling with Python* is now in the Tate Gallery, and George F. Watts (1817-1904), whose *Clytie*, in the same gallery, is a work of beauty and great power. Among the later sculptors of distinction are Thomas Brock (1847-), who represents a revolt against classicism; William Hamo Thornycroft (1850-), a sculptor of classical tendencies; Alfred Gilbert (1854-), the first English sculptor to preach and practice individualism; Edward Onslow Ford (1852-1901), famed for his delicately modeled portrait busts and statues; and J. M. Swan (1847-1910), a noted sculptor of wild animals.

Denmark. Bertel Thorwaldsen (1770-1844), next to Canova, exerted the most influence upon the art of his day in bringing about the classical revival. He is the greatest figure in the history of Danish art.

United States. Early American sculptors of prominence were influenced chiefly by the art of Thorwaldsen and Canova, and their work is classical in spirit. Among them were Horatio Greenough (1805-1852), Hiram Powers (1805-1873), sculptor of the celebrated *Greek Slave*, William Wetmore Story (1819-1895), Randolph Rogers (1825-1892) and Harriet Hosmer (1830-1908). A more distinctly American art was developed by such artists as Thomas Ball (1819-1911), Henry Kirke Brown (1814-1886), J. Q. A. Ward (1830-1910) and John Rogers (1829-1904). The Centennial Exposition, held at Philadelphia in 1876, is a landmark in the history of American sculpture, for since that time American artists have been wholly free from the influence of classic art. The most powerful influence has been that of the Paris schools and studios, in which numerous American sculptors have sought inspiration and knowledge. The best representatives of modern sculpture in the United States include Saint Gaudens and his gifted pupil Frederick MacMonnies, Daniel Chester French, Paul Bartlett, Charles H. Niehaus, A. P. Proctor, George Grey Barnard, Gutzon Borglum, Lorado Taft and C. J. Mulligan. B.M.W.

Consult Shedd's *Famous Sculptures and Sculpture;* Taft's *History of American Sculpture;* Hurll's *Greek Sculpture;* Perkins' *Italian Sculptors.*

Related Subjects. The following articles in these volumes will supplement the above discussion of sculpture:

Alto-Rilievo	Carving
Bas-Relief	Colossus
Bust	Elgin Marbles
Liberty, Statue of	Venus de Milo
Mezzo-Rilievo	Winged Bull
Parthenon	Winged Lion
Relief	Winged Victory
Sphinx	Wood Carving

SCULPTORS

Algardi, Alessandro	Partridge, William Ordway
Ball, Thomas	Phidias
Barnard, George Grey	Powers, Hiram
Bartlett, Paul Wayland	Praxiteles
Borglum, Gutzon	Rauch, Christian
Brown, Henry Kirke	Rietschel, Ernst
Canova, Antonio	Robbia, Della
Cellini, Benvenuto	Rodin, Auguste
Crawford, Thomas	Rogers, John
Donatello	Rogers, Randolph
French, Daniel Chester	Rude, François
Ghiberti, Lorenzo	Saint Gaudens, Augustus
Goujon, Jean	Schilling, Johann
Greenough, Horatio	Stoss, Veit
Hosmer, Harriet	Taft, Lorado
Houdon, Jean Antoine	Thorwaldsen, Bertel
Leighton, Frederick	Ward, John Q. A.
Lysippus	Watts, George F.
MacMonnies, Frederick	
Michelangelo Buonarroti	

SCURVY, *skur'vi,* a disease that was first prevalent among sailors during the period of long sea voyages following the discovery of America. It was caused by improper food and drinking water, when the crews were forced to live upon salt beef, hard tack and stagnant water for months at a time. The faces and bodies of victims would swell in places and show dark purple patches where blood vessels had broken beneath the skin; the teeth would become loose, the gums would ulcerate and bleed and the tongue swell and turn black. In severe cases the victim would become utterly exhausted and die of weakness or hemorrhage.

Sea scurvy is now almost unknown, though the disease sometimes occurs in camps and prisons or in besieged towns, where sanitary conditions are bad, and it is impossible to secure a variety of food. Improperly-fed infants occasionally contract a form of scurvy known as *Barlow's disease.* Treatment is necessarily along dietary lines. People who eat plenty of vegetables never contract scurvy, and lemon juice has been found a valuable preventive of the disease. The latter is by law required to be a part of the diet of all sailors in the British navy.

SCUTARI, *skoo'tah re,* a fortified town of Albania whose history dates back to the days of the ancient Romans, when it was called Scodra. It lies on the southeastern shore of the Lake of Scutari, about twelve miles from the Adriatic Sea, and is built on a plain enclosed on three sides by mountains. Near the town is

the meeting point of the Drin and Boyana rivers, the latter of which is navigable for small ocean vessels. The people of Scutari export skins, woolen goods, grain, tobacco, sumac, and a kind of sardine caught in the Boyana, and engage in the manufacture of firearms and cotton goods. Until 1913 Scutari was the capital of the Turkish vilayet of Scutari, but in that year, during the Balkan War, it was captured by the Montenegrins and became a part of the independent principality of Albania (see BALKAN WARS, page 554). In 1914, during the War of the Nations (which see), Scutari was again occupied by Montenegrins, but was recaptured by the armies of the central powers. In 1914 it had a population of about 32,000.

VARIOUS FORMS OF SEA ANEMONES

SCYLLA, *sil'ah,* in the Greek myth, a famous, six-headed sea monster, who was once a beautiful maiden, but was changed by Circe because of the latter's jealousy. She lived in a cave in a great cliff, so high that the top could never be seen. It was her custom to thrust her heads out of the cave and seize the animals and men that passed. From every ship each head took toll. Opposite the cliff of Scylla was Charybdis, another monster who continually drew in the water and threw it out again. The ancients located the rock Scylla and the whirlpool Charybdis in the strait of Messina. The difficulty of steering between the rock and the whirlpool gave rise to a popular expression, "between Scylla and Charybdis," as indicating two dangers, or evils, one of which must be chosen. "Between the devil and the deep sea" is a similar expression.

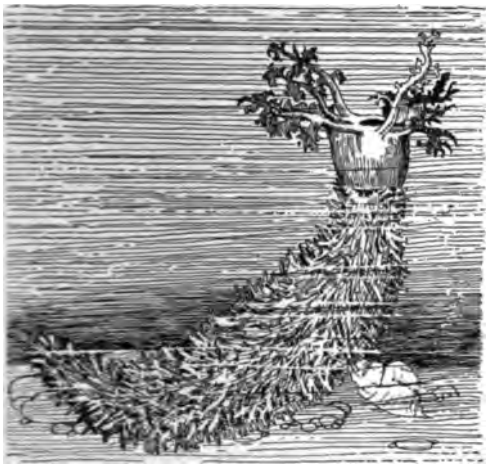
SCYTHE, *sythe,* a mowing implement, used principally for cutting tall grass and weeds. Scythes were used formerly for cutting grain, but the work was very tedious, and they have been supplanted by modern reaping and mowing machines. The scythe consists of a long, curved blade with a sharp edge, attached to the lower end of a long, upright handle called a *snath.* This is set at the proper angle for swinging the blade against the standing grass. Two short handles are made fast to the straight or crooked snath, some distance apart. As they are adjustable, the mower can place them up or down the main handle to suit his height. The cradle scythe has a blade about three and one-half feet long, attached to a four-foot handle on which another shorter handle, or helve, is also fastened. The cradle is a piece of wood with several teeth, joined to the heel of the blade. It catches the grain as it falls and lays it in even rows for binding. See MOWING MACHINE; REAPING MACHINE.

SEA ANEMONE, *a nem'o ne,* a group of interesting sea animals having much the appearance of flowers, from which fact the name is derived. They are second lowest among the great divisions in the animal kingdom, and with the jellyfishes and corals are placed in the branch *Coelenterata* (which see). As may be seen by the illustration, sea anemones differ somewhat in size and form, but in general the body is vaselike, with fringes of tentacles about the mouth. The average diameter is three inches, and they show varying hues of bright colors. These animals usually remain fixed through life to rocks or other places of attachment, but they have the power of slowly moving along on the base of the body. They are found in tide pools and on piles of wharves in harbors, as well as in deep waters.

It is by means of its tentacles that the sea anemone obtains its food, which consists of a variety of small sea animals. Certain tentacles are equipped with so-called lasso cells, which throw out barbed threads that paralyze the creatures they strike. The prey is then dragged into the mouth cavity by other tentacles and digested in a digestive canal. Some of the tentacles bear specks that serve as organs of sight. Sea anemones reproduce by eggs or by budding; in the latter case the new organism grows out from the base of the body and is finally detached, forming a new individual.

Consult Arnold's *The Sea Beach at Ebb Tide;* Mayer's *Sea-Shore Life.*

SEA CUCUMBER, *ku'kum ber,* the popular name of a group of sea animals belonging to the same branch as the starfishes, sea urchins and sea lilies (see ECHINODERMS). As the name indicates, they have long, rounded bodies, shaped somewhat like the familiar garden vegetable. At one end of the body there is a large mouth opening, encircled by a series of branching tentacles. These the animal expands and



SEA CUCUMBER

contracts as its seizes its food. It has five double rows of tube feet, which can be extended and used as organs of locomotion. There are several different species, found in all parts of the ocean. Those inhabiting tropical waters sometimes grow to be two or three feet long, but the sea cucumbers of temperate regions are only a few inches in length. Large numbers of an edible species are caught off the Great Barrier Reef of Australia and sent to Chinese markets under the name of *trepang* (which see).

SEA HORSE. See HIPPOCAMPUS.

SEAL, a word derived from the Latin *sigillum,* meaning a *mark* or *sign.* It is usually a device impressed on paper, metal or wax, to be attached to a document, together with a signature. The practice of using a seal on documents of importance has been followed without interruption since the fifth century before Christ, in the golden age of Greece. In Rome the Popes very early began to attach leaden seals to their official communications; these seals, called *bullae,* gave rise to the *bull* of the Popes.

In olden times it was customary to wear a ring, called a *signet ring,* flattened at the top, on which was engraved some special device. This ring, an ornamental finger ring, usually, was used to seal letters and documents, the design being pressed on the surface of the parchment or paper. The seal ring of the present day is the development of the older signet ring. The legal expression of "signed, sealed and delivered" is a relic of the times when both signature and seal were necessary to prove authenticity of letters.

Seals of Government. Every country, province and state has an official seal, without which no legislative act can go into effect. Such a seal must be affixed by the Secretary of State, in whose custody the official seal reposes. The legislative branch of a government—congress, state legislature or parliament—decides upon the character of the seal, which when once adopted cannot be changed except by the same law-making authority. Each of the forty-eight seals of the states of the American Union and the provincial seals of the Dominion of Canada are pictured in these volumes, accompanying the articles describing those political divisions.

Great Seal of the United States. On the day the thirteen American colonies proclaimed their independence (July 4, 1776) Benjamin Franklin, Thomas Jefferson and John Adams were appointed a committee "to prepare a device for a Great Seal of the United States." Their report followed in sixty days, but was not acted upon. In 1782 a seal was proposed which was acceptable to Congress and was adopted. It was not changed until 1885, when the Congress ordered a new design. Both sides of the present seal are shown in article UNITED STATES. The olive branch and arrows denote the hope for peace and the power for war, both peace and war being subject to the will of Congress, which body is typified in the eagle. The constellation denotes the thirteen original states of the

Union; the escutcheon is borne unsupported on the breast of the eagle, denoting that the country should rely solely upon its own strength and virtues. The pyramid on the reverse side signifies duration and solidity. The eye above it and the motto above refer to the many interpositions of Providence in favor of the American people. The date (1776) in Roman numerals and the lower motto signify the beginning of a new era at that time. F.ST.A.

SEAL, a strangely-formed, warm-blooded, air-breathing animal which has its various body structures so modified that it is able to live in the water as well as on the land. However, except at the mating season, seals spend most of their time in the sea.

What a Seal Looks Like. If seen on land, a seal is incredibly awkward, but in the water it is beautiful and graceful. It has a tapering body, with thick, woolly fur and long, shining hair, and is so sleek and oily that it glides easily through the water, finlike feet serving as paddles and as rudder. Particularly graceful are the quick, darting movements with which it seizes upon its prey of small fish. A seal has a tail, but it is so short as to be practically useless, while the limbs also are short, the greater part of their length being hidden beneath the skin. The head is small and round, the neck short, the mouth large and provided with numerous "feelers," like those of the cat.

Where Seals Live. The Caspian Sea and Lake Baikal have two species of seals, but with these exceptions all members of the family live in the ocean. For the most part they do not like the warm climates, though a few species do live in the tropic and temperate zone seas. But toward the far north and the far south the sea teems with them. They tumble about in the water most of the year, but at breeding time are to be seen in vast numbers on the shore rocks and the icebergs. It is not only their thick coat of fur, or hair, which protects them from the extreme cold, but the layer of fat, or blubber, which lies just under the skin. Intended thus solely for their protection, this blubber has contributed to their destruction, for it is one of the things which men much desire as an article of commerce, and for it seals have been killed by thousands.

Intelligence of Seals. Seals of one species or another have long been familiar in zoölogical gardens, where children have delighted to watch their awkward movements as they draw themselves up on the rocks, and to listen to their hoarse barking; but in recent years men have found another way to make these animals contribute to their amusement, and trained seals are now an important part of almost every circus. Just because they are so lumbering and awkward and seem so much farther down in the scale of life than any of the land animals, the tricks which they perform seem almost incredible. Some students claim that their teachableness is a sign of their superior intelligence, while others declare that it is but the outgrowth of instinct and of a desire for the fish which the keeper gives them at intervals.

Certain it is that seals in their native haunts seem far from intelligent. The homing instinct they possess to perfection, coming back each year to the same breeding spot as unswervingly as a bird returns to its last year's nesting tree; but that suggests a lack of intelligence rather than the contrary, for it is on these well-known breeding spots that they are most likely to meet with destruction at the hands of men.

The life habits of seals are very interesting. As they have been studied most closely in connection with the *fur seal,* they will be discussed in the section of this article devoted to that species.

Kinds of Seals. A thoroughly satisfactory classification of seals has never been made, but a simple, serviceable division separates them into two groups; these are the *eared seals,* which have external ears and for the most part soft fur under their long hair, and the *true seals,* which have no external ears and no fur.

To the former group belong the *fur seal,* or sea bear, and the *sea lion,* while in the latter are included the *common seal,* or harbor seal, the *harp seal* and the *elephant seal,* or sea elephant. Some authorities include the walrus among the seals, but while it is related it does not belong to the same family as those which are mentioned above. See WALRUS.

The Fur Seal

By far the most important commercially of all the seals is the fur seal. It has another name—*sea bear*—which is perhaps better than its usual one, for it seems to be more closely related to the bears than to the true seals. True, it likes fish and it spends much of its time in the water, but beyond that its seal-like points are few, while structurally it is very much like a bear. It can move about on land

FUR SEALS, ORIGINAL OWNERS OF LADIES' SEALSKIN COATS

far more easily and rapidly than does the true seal, scaling the rocks and even running in a lumbering manner. What makes the sea bear so valuable is the soft, dense fur, usually brownish black, which is almost hidden by the water hair. A live seal is not beautiful and soft and glossy like a sealskin coat, for the long outer hair is coarse and grayish.

Life Habits. Time was when there were great herds of these seals, but they have been killed literally by millions for their fur, and to-day the few herds that remain are very small as compared with their former size, and great fear is felt lest they may become extinct. Most important of all the fur seals is the herd, forming a distinct species, which makes its home on the Pribilof Islands, a barren group in Bering Sea.

Fascinating indeed has been the study of the curiously ordered life they live there, and men of science have sought the islands as eagerly as have the fur traders. Through the winter the seals which make up this herd are scattered about the waters of the North Pacific; some of them never leave the icy seas about Alaska, but others venture as far south as the coast of California. But wherever they may be, when spring comes instinct leads them back to the desolate little islands. By thousands they arrive, the old males, or bulls, first; and many of them have some specially favored places which they seize each year, fighting to the death with any intruder. A seal bull is a formidable creature, frequently weighing as much as 400 pounds, and he regulates his household and his surroundings as he sees fit.

Several weeks after the bulls have arrived the females, or cows, come; they are graceful, gentle creatures, not usually more than one-fourth as large as their lords and masters. These seals are polygamists; each bull gathers about him as many females as he can, sometimes as many as a hundred, and over these he exercises the strictest care. Other bulls will try to steal them, but this he is prepared for; and to prevent it he will fight viciously. Hundreds of the females are torn in pieces every year by these contending males, and the rocks echo and reëcho with the roaring of the fight-

ers. Strangely enough, through all of this period of exertion the males fast; they do not taste food from spring until August or thereabouts.

Soon after the adjustment into households is completed the little seals, or pups, are born. They are sleek, squirmy little animals, weighing about ten pounds each, and from the first are as playful as kittens. Soon after her baby's arrival the mother seal becomes hungry, and swims away in search of food. The little seals are left in a great group, or *pod,* hundreds of them together, with absolutely no mark to distinguish one from another, but the mother on her return after a week's absence has no difficulty in identifying her offspring; unerringly she picks out her own pup, now clamorously anxious for food. Attempts have been made to show that these mother seals have a real affection for their young, but the tales of their devotion have been much exaggerated. The theory, however, has given rise to at least one charming poem, Kipling's *Seal's Lullaby,* in which he says:

Oh, hush thee, my baby, the night is behind us,
And black are the waters that sparkled so green,
The moon, o'er the combers, looks downward to find us
At rest in the hollows that rustle between.
Where billow meets billow, there soft be thy pillow;
Ah, weary wee flipperling, curl at thy ease!
The storm shall not wake thee, nor shark overtake thee,
Asleep in the arms of the slow-swinging seas.

A group of young seals learning to swim is, say those who have watched it, a most amusing sight. The six-weeks-old babies do not "take to water like a duck," for their heads are very heavy and the rest of their bodies disproportionately light, and they find as great difficulty keeping themselves in swimming position as do young birds in learning to fly.

Until November or December, according to the weather, the herd remains on its favorite *rookery.* Discipline is relaxed, and the females and young bulls are no longer dominated and terrorized by the old bulls. There then comes a day when the seal instinct says "Go," and the great herd puts off into the sea until another spring shall come round. On several other groups of islands, some belonging to Russia and some to Japan, are other herds of fur seals, but none is so large or so important as this Pribilof Island herd.

Securing Sealskins. The young males are the class killed for fur, for there are as many males born as females, and since every bull has a large harem, many of the males are unnecessary. Since the old bulls will not allow them to set up families until they are seven or eight years old, the young males herd by themselves, and the hunters kill them by clubbing them when they are on land. The skins—which must be removed carefully, as a cut skin is rejected—are salted and packed in the holds of vessels until the close of the season. A long process is gone through before these rough, hairy pelts become the beautiful skins that are placed on the market. The coarse gray hair is removed, leaving the soft fur exposed, and the skin is carefully dyed, not by dipping, but by repeated treating with a brush.

Fur-Seal Legislation. The United States, after it came into possession of Alaska, attempted to regulate most carefully the killing of seals on the Pribilof Islands. A lease was given to but one company, which was allowed to take only 100,000 skins a year, and those only from male animals; but the demand was far greater than this supply, and seal poaching, or stealing, became most common. The poachers did not dare approach the islands and kill the seals on land, but frequented the neighboring waters in the summer time and took the seals from the water. All of these were of necessity females, since the males remain on land all summer, and for every mother that was killed a baby seal on the rocks starved to death. In twenty years, it was estimated, a million females were killed in the sea, and a million pups died in consequence. Stricter and stricter regulations were passed, for it became clear that the seals would sooner or later be exterminated, and in 1910 a law was passed by Congress prohibiting seal killing absolutely for five years. The islands can be patrolled, but to stop poaching in the open sea is far more difficult, as no one nation has jurisdiction over the water more than three miles from shore. To-day not more than 200,000 seals return each year to the Pribilof Islands, in place of the millions that visited the spot thirty years ago.

Other Seals

Sea Lion. This is another eared seal, a near relative of the fur seal, from which, however, it differs in one important point. It is a hair seal, that is, it has not the soft underfur which

makes the other so valuable commercially. There are two chief groups of sea lions—the so-called Steller group and the California sea lions. The former reach the greatest size of any of the eared seals, the males attaining a length of from ten to fifteen feet and a weight of from 1,000 to 1,300 pounds. In all the northern Pacific, from California to Japan, this huge animal is to be found, and the Indians of the Aleutian Islands count them among their chief prizes. They eat the flesh, either fresh or dried,

THE SEA LION

use the skins for boat coverings and the flippers for boot soles, blow up the stomach to serve as an oil bag, and make thread of the sinews.

The other sea lions are those timid, gentle creatures which are seen in such numbers on the Cliff House rocks at San Francisco. They are much smaller than the species described above, and are almost black. Nearly all the seals seen in menageries and circuses are of this species.

True Seals. Of the true seals the commonest is the little, yellowish-brown harbor seal, which is an interesting visitor in Atlantic ports. Like the fur seals, the harbor seals are in danger of extermination, for while they have no fur they yield a valuable oil, and their skin is used for leather. Strangely enough, this animal shows a real delight in musical sounds, but its own voice is far from musical, being a sort of bleat which has won for the animal the name of *sea calf*.

Sea Elephant or Elephant Seal. This is the largest of all the seals, a huge creature which may measure thirty feet in length. It is a hideous appearing animal, with its small eyes, long, tusklike teeth, and the short, wrinkled *trunk* which gave it its name, but it is very valuable, for a single male has been known to yield over 200 gallons of oil. Formerly sea elephants were numerous along the coasts of Lower California and Mexico, and great rookeries existed as far north as Santa Barbara, but like other members of the seal tribe the sea elephants have been ruthlessly slaughtered until now they find a peaceful home only on some of the islands in the Southern Pacific. In their manner of life they much resemble the fur seals, especially in the fights which the males wage for possession of the females and in their fondness for their chosen spots. A.MC C.

Consult *Treasury Department Document No. 2017*, "Fur Seals and Fur Seal Islands of North Pacific Ocean," Washington, D. C.

SEA LEMON, a free-moving mollusk found in the warmer parts of the ocean, so called because it somewhat resembles a lemon in shape and is yellowish in color. It has a soft body like a jellyfish, and is without a shell covering. The gills form a tuft of plumes on the back of the animal, and at the front there are two leaflike tentacles. The sea lemon glides about slowly by means of a flat foot. The adult animal is about three inches long. See MOLLUSKS.

SEA LILIES. See CRINOIDEA.

SEAL'ING WAX, a composition of rosin, shellac, turpentine and coloring matter used for sealing letters and documents and for taking the impression of seals. Before the advent of envelopes with gummed flaps sealing wax was in general use for sealing letters, but now it is seldom employed for that purpose. That used for letters and documents is colored with vermilion and placed on the market in the form of sticks. An inferior grade used for sealing packages is usually colored with lampblack. An inexpensive wax for sealing bottles and cans of preserved fruit is made by mixing nine parts rosin with one part beeswax and heating the mixture until melted. If coloring matter is desired lampblack or ocher may be used. The necks of the bottles should be dipped in the wax. Sealing wax is supposed to have been invented by the Chinese in the seventh century.

SEA LION. See SEAL, subhead *Sea Lion*.

SEARCH, RIGHT OF. A nation at war has the right under international law to visit and search merchant ships of neutral nations for the purpose of verifying the nationality of the vessel and of ascertaining whether or not the cargo includes property of the enemy, or merchandise that is contraband of war (see CONTRABAND). The visitation and search must be made by the officers of a warship of the belligerent.

Right of search is not permissible in times of peace, except when a cruiser is sent in pursuit of a merchant vessel suspected of violating the revenue laws, or when there is good reason for suspecting that a vessel is a pirate.

In making the search the ship's papers are first examined. These papers contain the name of the master, the name of the ship, the name of the port from which the ship has sailed and of the port for which it is bound. The papers should also contain a description of the cargo, and should certify that the officers have complied with the customs regulations of the country from which it has sailed. If the papers are correct the search usually ends with their examination. If, however, suspicion is aroused, the cargo is examined. Any officer refusing to stop his ship and to allow it to be searched by proper authorities is liable to have both ship and cargo confiscated.

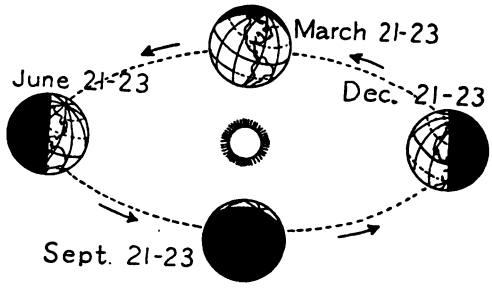
The Hague Conference of 1907 and the conference in London in 1909 threw a number of restrictions around the right of search. One of these was that the mails of neutral nations should be free from search and that in case the neutral vessel was detained these mails should be forwarded at the earliest possible date. However, Great Britain set this and various other provisions of these conventions temporarily aside soon after the outbreak of the War of the Nations, as a necessary measure against spies, while Germany, in its submarine warfare, established new precedents altogether in the matter of intercepting commerce.

The right of search in times of peace, in so far as it applies to the private premises, persons and property of peaceful citizens and subjects, is safeguarded by law. See PEACE CONFERENCE, INTERNATIONAL; WARRANT, subhead *Search Warrant*.

SEASICKNESS, *se'sik nes,* a disagreeable illness resulting from the pitching and rolling of a vessel at sea. The symptoms are dizziness and pain in the head, nausea, a sinking sensation in the stomach, and vomiting. In case of a severe attack the skin becomes pale, almost green, and damp; the pulse is feeble and the whole body utterly exhausted. Seasickness is the result of a lack of nervous adaptability; this may be described as a failure of the nerves to adjust themselves to having the sense of balance upset. But why this sort of nervous shock should result in acute illness no one knows. The same type of disturbance is experienced by those people who become ill from swaying in a hammock or swing.

Nothing has been discovered which will prevent seasickness, and there is no positive cure for it. Some obtain relief by using a nerve sedative; for others a nerve tonic is better. The quickest relief is gained by lying motionless, preferably in the open air, with the head low. Liquid nourishment should be taken, if possible, to keep up the strength. Seasickness, provided there are no complications, is never fatal. In most cases, unless there are severe storms, the attack disappears after a few hours and does not return again during the same voyage. The susceptibility of different persons to seasickness varies considerably. There are many people who seem to be immune.

SEASONS, *se'z'nz,* the periods into which the year is naturally divided, by changes in temperature and by alterations in the lengths of the days and nights. In the course of a year the earth revolves around the sun, always with its axis tipped or inclined a little (23½°) toward the plane of its orbit. For about half the year the vertical rays fall north of the equator; on the 21st of June they are farthest north, and on that day summer begins in the northern hemisphere and winter in the southern. On the 22nd of December the conditions are exactly reversed. On the 21st of March the sun is at the vernal equinox, and on the 22nd of September at the autumnal equinox; on these days the sun is directly over the equator. In the northern hemisphere spring and autumn, respectively, begin on these days Thus spring extends from the vernal equinox (March 21) to the summer solstice (June 21); summer from the summer solstice to the autumnal equinox (September 22); and winter from the winter solstice to the vernal equinox.



THE SEASONS

In summer the northern part of the earth is more than half in sunshine and the southern part more than half in darkness. Thus a point in the north has daylight during the greater part of the twenty-four hours of the day. The farther north one goes the more daylight he finds, and around the Pole there is no darkness during this season. In the winter, conditions are reversed.

The four seasons are noticeable generally in the temperate zones, but in the torrid zone there is usually only a wet and a dry season. The polar regions, too, have only two seasons, winter and summer. Ordinarily in the northern hemisphere the months of March, April and May are called the spring months; June, July and August, the summer; September, October and November, the autumn; and December, January and February, the winter months. In the southern hemisphere the seasons are reversed, spring beginning in September, summer in December, autumn in March and winter in June.

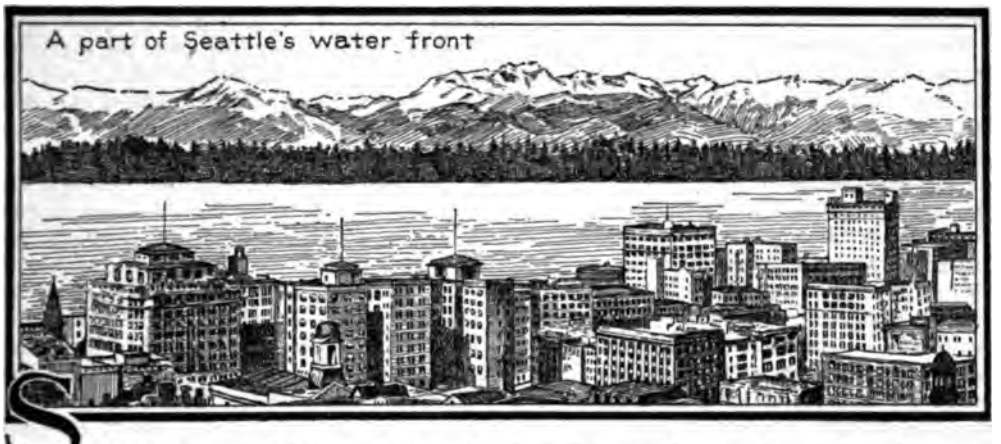
Related Subjects. The reader is referred to the following articles in these volumes:

Astronomy	Equinox
Earth	Solstice

SEA SQUIRTS, *skwurts,* or **ASCIDIANS,** *a sid'i anz,* a group of mollusks of a low order, so called because they have the habit of squirting out jets of water when irritated. The young of these animals resemble the tadpole of a frog and are free-swimming; the adults have leathery, bottle-shaped bodies and remain through life attached to stones, shells, wharves

SEA SQUIRTS

and other fixed objects. The mature form is simpler in structure than the tadpole.



SEATTLE, *se at'l,* WASH., the largest city of the Pacific Northwest, the county seat of King County and one of the most important seaports on the Pacific coast of America, is situated on the east shore of Puget Sound, 864 miles by water north of San Francisco and 185 miles by rail north of Portland, Ore. The Canadian boundary is 125 miles to the north.

General Description. Seattle occupies a beautiful site, with the snow-capped Olympic Mountains and Puget Sound on the west and Lake Washington and the Cascade Range on the east. Lake Washington, twenty-two miles long and four miles wide, is connected with Puget Sound by a ship canal over eight miles long. The canal passes through Lake Union, in the north-central part of the city, and connects with the Sound by means of a large lock, made necessary by the difference in levels between the bodies of salt and fresh water. The completion of this canal greatly extended the city's water front. The site is hilly, and some parts of the city have an altitude of 500 feet. Many streets extending east and west traverse steep slopes, but by means of cable cars the inhabitants travel them with ease. In three localities where these elevations offered the greatest obstacles to the city's progress they were removed. Jackson Street was lowered 124 feet below its highest point; Denny Hill was lowered 130 feet.

and a section of Third Avenue was also graded down. The earth removed was used in filling depressions. This regrading required the removal of 11,750,000 cubic yards of earth and cost the city $3,500,000, but it transformed three practically inaccessible hills into valuable business centers.

The city is attractively laid out. The streets are broad and straight, and with few exceptions they cross at right angles. Most of the streets extend approximately north and south and east and west. The wholesale and manufacturing district borders on Puget Sound, and the water front has ample dock facilities for the ocean-going vessels that frequent the port. Adjoining this district and on slightly higher ground is the business center, characterized by many substantial structures of steel and concrete and not excelled by those of any other city. The residential districts are on the higher elevations, and many slopes are adorned with beautiful homes surrounded by lawns and gardens. An excellent street railway system connects all parts of the city and the adjoining suburbs, and two interurban lines extend to important towns in the surrounding country.

Parks and Boulevards. The parks and boulevards are unusually complete for a city of the age and size of Seattle. There are 1,815 acres under the jurisdiction of the park commissioners, including forty-four improved parks and twenty-four equipped and supervised playgrounds. There is a well-equipped municipal beach and pavilion at Alki Point, and municipal golf links are maintained at Jefferson Park. Seward Park is on Lake Washington. A zoölogical garden is located in Woodland Park, which also has an athletic field, picnic grounds and bathing and boating facilities. Ravenna is noted for its large trees, mineral springs and beautiful cascades. Volunteer Park, on Capitol Hill, overlooks both Puget Sound and Lake Washington and contains the municipal conservatory and a statue of William Henry Seward. The campus of the University of Washington, with an area of 355 acres, is noted for its beautiful gardens. All these parks are connected by boulevards and winding drives. The boulevard system is about fifty miles in extent and touches all the more sightly elevations in and about the city.

Buildings. Among the most attractive church edifices are Saint James Cathedral, the First Presbyterian, First Baptist Church and the First Church of Christ Scientist. The most noted business or office buildings are the L. C. Smith Building (forty-two stories), the highest office building in America outside of New York City; the Metropolitan Building, and the Hoge, Alaska and Cobb buildings. Among the public buildings of note are the city and county building, the King Street passenger station, the O.-W. and Milwaukee station, Washington Hotel and Providence Hospital. The Metropolitan, Moore, Pantages, Wilkes and Orpheum are the leading theaters. The Arctic, Sunset and Rainier clubs are each housed in beautiful and commodious structures.

Manufactures. Inexpensive water power and electric power obtained from plants in the surrounding country have made Seattle the most important manufacturing center in the northwestern part of the United States. The manufacture of lumber and lumber products is the leading industry of Western Washington, and shipbuilding that of Seattle. The fisheries of Alaska and Puget Sound are centralized in Seattle, and it is estimated that 100,000 tons of fish and fish products are handled each year. More than $7,000,000 worth of salmon, halibut and cod are packed or shipped in ice, and large quantities of salmon are canned here. Slaughtering and meat packing, the manufacture of flour, printing and publishing, and the manufacture of machinery are among the other leading industries. Port Blakeley's lumber mills are the largest in the world.

Transportation and Commerce. Seattle is the terminus of eight transcontinental lines of railway, four of which—the Great Northern, the Northern Pacific, the Chicago, Milwaukee & Saint Paul and the Union Pacific—enter the city over their own tracks. The Southern Pacific and the Chicago, Burlington & Quincy have traffic arrangements with other lines, and the Canadian Pacific and Grand Trunk Pacific have steamship connection. Elliott Bay, the central harbor of Seattle, is one of the best land-locked harbors in the world. Owing to its northern location, the routes between Seattle and the ports of China and Japan are shorter than those between the Orient and any other port in the United States, and this advantage has made Seattle one of the leading seaports of the country. Large quantities of silk, tea and other commodities entering the United States from the Orient pass through the city. Seattle is the headquarters for trade with Alaska, and the trade with the surrounding country is also important. The Assay Office here handles all the gold that comes from Alaska and the Yukon region.

Education. The public schools are under control of a board of education which is independent of the municipal government. The University of Washington, under the management of the state, is the largest institution for higher education in the Pacific Northwest (see WASHINGTON, UNIVERSITY OF). Washington Preparatory School for Girls, the Academy of the Holy Name, the College of Our Lady of Lourdes, Adelphia College and Seattle College are all schools of a high order of excellence. The public library maintains nine branches and has over 265,000 volumes.

Institutions. Seattle contains a number of hospitals, chief among which are the Municipal Hospital, maintained by the city; the County Hospital, in charge of the county commissioners, and the Swedish, Seattle General, Miner and Providence hospitals. There are a number of benevolent societies in the city and the usual church organizations for charitable work.

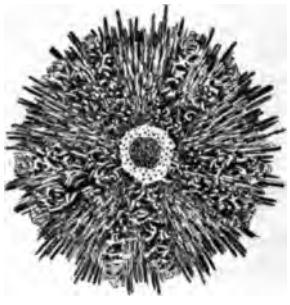
Growth. Seattle has had a rapid but a substantial growth. In 1880 the population was only 3,500; in 1890 it was 42,837; in 1900, 80,871; in 1910, 237,194, and in 1916, 348,639 (Federal estimate). A very large part of the population has come from the eastern and central parts of the United States.

History. The site of Seattle was undoubtedly once well known to the Indians of the Northwest. The first white settlement was made in 1852. Four years later it survived an attack by Indians, was incorporated as a town in 1865 and as a city in 1869. The first railroad from the East was completed in 1884. In 1889 the city suffered from a disastrous fire. This and the financial depression of 1893 delayed its development. In 1897 gold was discovered in Alaska and the Yukon region, and Seattle immediately became the outfitting point of this great field.

In 1909 the Alaska-Yukon-Pacific Exposition (which see) was held in Seattle for the purpose of exhibiting the resources of that region. At the close of the exposition a number of the principal buildings became the property of the University of Washington. P.N.

Consult Beaton's *A City that Made Itself.*

SEA UR'CHIN, an animal belonging to the same group as the starfishes, sea lilies and sea cucumbers (see ECHINODERMS), the body of which is covered with tiny limestone plates bearing hinged spines. "Without its spines," says one authority, "a sea urchin looks like an old-fashioned door knob." On its lower surface the sea urchin has a circular opening containing the mouth; on the upper surface are the eyes and the openings through which the eggs emerge. Through tiny holes in the body covering the animal thrusts out tube feet having sucking disks. With these suckers it draws small animals into its large mouth, which has five sharp teeth for grinding the food. The tube feet are used also as organs of locomotion, and some of them are employed as feeling tentacles. The various species are found in shallow water in most parts of the world. In the Mediterranean Sea there is a large species used as food. A sea urchin found on the California coast can burrow holes into solid rock. These animals all reproduce by eggs.



SEA URCHIN

SEA'WEED, any plant that grows in the sea. There are numerous varieties of seaweed and several of them are useful. For instance, blanc-mange, a popular dessert, is prepared from Irish moss, or carrageen, which is also a valuable cattle food. Eel grass is employed in upholstering; the ash obtained by burning kelp is an important source of iodine, and the plant when dried and ground makes a valuable fertilizer, since it contains a large percentage of potash. Seaweed collects in large masses in those parts of the ocean that are free from currents. On account of its bulk and weight it cannot be transported far with profit, but large masses frequently drift near the shore, where they become available. Accumulations of this sort are found near the Philippine Islands and in several places off the Atlantic and Pacific coasts of the United States.

Related Subjects. For further information on this subject the reader should consult the following articles:

Algae	Kelp
Ash	Sargasso Sea
Irish Moss	Water Plants

SEBASTIAN, *se bas'chan,* SAINT, one of the early defenders of the Christian faith, who was put to death by the Emperor Diocletian. He entered the Roman army without revealing his intent to assist and protect the Christians, found favor with the emperor and became commander of the first cohort at Milan. His re-

ligious faith having been discovered, he was condemned to death, tied to a tree and shot with arrows by a troop of archers. He was left as dead, but life was not extinct, and he was cared for in the home of a Christian lady named Irene. After his recovery he again publicly professed his faith. Thereupon the emperor ordered him to be beaten to death with clubs, in the amphitheater. He was buried in the catacombs. The martyrdom of Saint Sebastian was a favorite subject of the early Italian painters.

SEBASTOPOL, *se bas' to pohl,* a fortified Russian city on an inlet of the Black Sea, famous as the scene of one of the greatest sieges in history (see subhead *Crimean War,* in article CRIMEA). Sebastopol is situated in the southwestern part of the Crimean peninsula, on a magnificent harbor that has become the most important naval station in Southern Russia. Since the close of the Crimean War, in 1856, the city has been practically rebuilt, and now contains handsome cathedrals, two museums, extensive docks and several monuments in commemoration of the war. The principal industrial establishments are the shipbuilding yards. This city was bombarded by the Turks in the War of the Nations. Population in 1913, 77,000.

SECESSION, *se sesh' un,* WAR OF. See WAR OF SECESSION.

SECORD, *se' kawrd,* LAURA, a Canadian heroine, whose courage gave the British a victory in the Battle of Beaver Dam, during the War of 1812. It was in 1813, in the midst of the Niagara campaign, that Mrs. Secord performed the feat which made her famous. The British forces had been retiring before the enemy until Sir John Harvey checked the American advance at Stoney Creek. As a result of Harvey's victory the British stationed a force of about fifty regulars and 500 Mohawk Indians at Beaver Dam, about half way between Stoney Creek and the Niagara River.

The Americans planned to surprise and capture this force at Beaver Dam. Secord, a wounded militia officer who was then living at Queenston, overheard several Americans discussing these plans. He himself was unable to warn the force at the Dam, but his wife, Laura Secord, undertook the errand. Driving a cow before her until she reached the woods, in order to avoid suspicion, she then set forth on a tramp of twenty miles, through dense forests, in constant danger from lurking Indians or from Americans. It was an all-day tramp, and Mrs. Secord was quite exhausted when she finally gave the warning to the British commander. When the Americans then advanced to the attack, the British and their Indian allies were ready, and started such a fierce fire that the American commander thought himself surrounded by a large force and surrendered.

A MEMORIAL
"To perpetuate the name and fame of Laura Secord."

This victory did not involve large forces, but it gave the Canadians much encouragement. Mrs. Secord became famous in a day. After the close of the war she lived quietly for many years in a little cottage at Niagara which is still pointed out to visitors.

SECRETARY, *sek' re ta ri,* **BIRD,** a falcon-like bird of large size, about four feet long, found in South Africa. It takes its name from the tufts of feathers that project from the sides and back of its head, giving it a resemblance

to a clerk, or secretary, with quill pens behind his ears. It has very long legs and tail, and ordinarily it prefers to run rather than to fly.

Its food includes frogs, insects, lizards, small tortoises and snakes. The latter it strikes with its wings or feet, or perhaps it flies with its victim high in the air and kills it by letting it fall to the ground. In Cape Colony a fine is imposed for killing the bird, because of its destruction of snakes. It builds a bulky nest, in a tree or bush The eggs, two or three in number, are a dull white, spotted with rust color.

The South African farmers sometimes tame secretary birds and keep them about their buildings to destroy the vermin, but unless they are well fed they are likely to kill and eat the poultry.

SECRETION, *se kre'shun,* in physiology, is the process by which various glands or membranes of the body separate certain materials from the blood and form them into new fluids. These fluids are called *secretions.* Examples are bile, secreted by the liver; gastric juice, made by digestive glands; saliva, poured from the salivary glands; and the lubricating fluid (synovia) which keeps the joint surfaces working smoothly. The fluids mentioned are known as *true secretions,* because they each have a special work to do. There are other fluids, known as *excretions,* which are separated from the blood, but these differ from true secretions in that they are discharged from the body as waste matter and in that they are abstracted in the form in which they are found in the blood. Examples of excretions are urine and perspiration.

Related Subjects. The following articles may profitably be read in connection with this subject:

Bile	Mucus
Digestion	Pancreas
Kidneys	Perspiration
Liver	Saliva
Membranes	Urine

SECRET SERVICE, *se'kret ser'vis,* the organized system of secret espionage, or active surveillance, which is established by a government for its protection against violation of national law and against enemies at home and abroad. The officials work in secret, and certain sums of money are placed at their disposal, for which they are required to render only a private account to their superiors.

Such a bureau was established by the United States government in 1860, primarily to detect and arrest counterfeiters of its currency. During the War of Secession its operatives were loaned to the War Department in connection with military movements, and they performed efficient service in obtaining information relating to the enemy. Inasmuch as the office was intended from the beginning to war on counterfeiters, it was made a bureau of the Treasury Department and has always remained as such. However, other departments of the government are free to call on the Treasury officials for secret-service operatives.

The bureau is presided over by a chief, whose office is in Washington; there are twenty-eight branch offices in various cities of the country, each in charge of a chief operative. There are hundreds of operatives in the service, and because of the secrecy necessary to the successful operation of the bureau few of these are known to each other.

At no other period in the world's history did the various nations make such extended use of their respective secret-service departments as in the War of the Nations. The ramifications of the German service extended to all parts of the globe, and so efficient was the system developed that the Imperial government obtained the most carefully-guarded news even from countries with which Germany was at war. The United States secret service, after America's entrance into the war, was called upon to perform a gigantic task, for the vast extent of country and diversity of nationalities made possible endless forms of plotting against the government. The utmost ingenuity of the British service was demanded to cope with the German intrigue, and then not always with success.

SECRET SOCIETIES. See FRATERNAL SOCIETIES.

SEDALIA, *se da'li a,* Mo., a railroading and manufacturing center and the county seat of Pettis County, situated in the west-central part of the state, 188 miles west of Saint Louis. It is on the Missouri Pacific and the Missouri, Kansas & Texas railroads, both of which have large shops here. In 1910 the population was 17,822; it was 19,449 (Federal estimate) in 1916. The area exceeds six square miles.

Sedalia has the George R. Smith College (colored), the Convent School of the Sisters of Saint Joseph, a Federal building erected in 1896 at a cost of $70,000, a county courthouse, Convention Hall, Y. M. C. A. building, Carnegie Library, two hospitals and Liberty Park (forty-six acres). The Missouri State Board of Agriculture conducts an annual state fair in grounds near the city. The industrial establishments include railroad car shops, a meat-packing plant, a candy factory, large clothing factories

and manufactories of farming implements and carriages. Here, also, is a large horse and mule market. Sedalia was founded by General G. R. Smith in 1861.

SEDAN, *se dan'*, BATTLE OF, a decisive engagement of the Franco-German War, fought on September 1, 1870, at the fortified town of Sedan, 164 miles northeast of Paris. About 17,000 of the French army, under Marshal MacMahon, were killed or wounded, and on September 2 nearly 2,900 officers and 83,000 privates, together with Emperor Napoleon III, surrendered to the Germans. When the news reached Paris that Sedan had fallen, the Second Empire was overthrown and a republic was established. For events preceding the battle, see FRANCO-GERMAN WAR.

SEDATIVE, *sed'a tiv,* a drug, taken internally or applied externally, which exerts a soothing influence on any part of the organism by numbing the senses or lowering activity. Sedatives vary in their effects; the same one may soothe one part and excite another, and one administered in small quantities may alleviate pain and in large quantities may irritate. Again, a hot poultice may act as a sedative in one part of the body and an ice pack have the same effect on another part. Drugs, heat, cold and friction are all sedative agents of varying degrees of effectiveness.

Related Subjects. The reader is referred to the following articles in these volumes:

Anesthetic	Medicine and Drugs
Disease	Narcotic

SEDGE, the name of a large family of plants closely resembling the grasses and found growing in clumps in damp places in almost all parts of the world. In the sedges the sheath which enfolds the stem is entirely closed, and the stems, often triangular, are usually solid; but the grasses almost always have the stem sheath split on one side, and this difference is sometimes the only feature by which the average nature lover can tell the two apart. The spikelets of sedge flowers are small, each floweret being enclosed by one scale instead of by several, as in the grasses. The tubers of some species are good to eat; from the fragrant roots of others perfumes are made; while the Egyptian papyrus, another variety, had many important uses. See PAPYRUS.

SEED'ER. See SOWING MACHINE.

SEEDS. The plant grows to bear a flower, and the flower blooms to produce a fruit. The chief part of the fruit in respect to the plant is the seed, for it is that part from which another plant grows. Seeds are sometimes called "plant babies," because within each seed is a tiny plant waiting to grow.

"First a seed so tiny
Hidden from the sight,
Then two pretty leaflets
Struggling toward the light;
Soon a bud appearing
Turns into a flower,
Kissed by golden sunshine,
Washed by silver shower."

Parts of a Seed. The parts of a seed are the tiny plant, or embryo, the food for the embryo and the seed coat. The coat may be thin and smooth, as in the bean, or thick, rough and hard, as in the peach pit. The food for the embryo, which consists chiefly of starch and albumen, is stored around the embryo, as in the bean and the corn, or it may be almost entirely absorbed by the embryo, which nearly fills the space enclosed by the seed coat. This is usually the plan in small seeds. In Fig. 1, *a, b, d* and *e* show these parts of the seed. In *a* the embryo is in the center of the lower part of the seed; *d* represents a bean, in which the embryo can be seen by soaking a large bean in water for a few hours, then opening it, as shown in the cut. A study of Fig. 2 shows other seeds in which the position and shape of the embryo may be distinctly seen. A study of these illustrations shows that no two plants have seeds exactly alike.

The food for the embryo is stored in the seed on three general plans, and botanists have divided all flowering plants into three great

divisions in accordance with these plans. When a bean or a squash seed germinates, two thick leaves shaped like the halves of the seed are the first objects to appear above the ground. Between them we see the tiny plant ready to put forth its leaves. The two thick leaves contain the food for the embryo, and when the food has been absorbed by the growing plant-

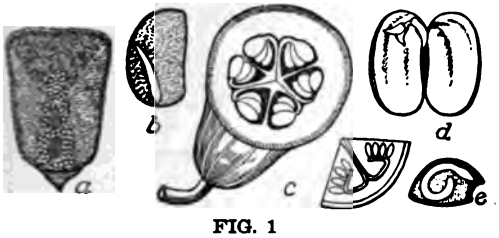


FIG. 1

(*a*) Cross section of a grain of corn; (*b*) cross section of asparagus seed; (*c*) cross section of squash and one carpel; (*d*) common bean, split open; (*e*) cross section of onion seed.

let they wither and fall. They are known as *seed leaves,* or *cotyledons,* a name which comes from a Greek word meaning *hollow* or *cuplike.*

When corn germinates no seed leaves appear above the ground, the first leaf being the tiny shoot which unfolds into the young corn plant. If we look at the kernel of corn (*a,* Fig. 1), we see that the embryo is surrounded by plant food upon all sides. We cannot divide the corn into halves as we can the bean, because this food is all stored in one mass. That is, the corn has only one seed leaf, or cotyledon. All plants having seeds with only one cotyledon are called *monocotyledonous* plants. Corn, wheat, oats, barley and grasses are good examples of plants belonging to this division.

We have seen that the bean and squash produce seeds with two seed leaves. All plants

FIG. 2

(*a*) Lengthwise section of a pansy seed; (*b*) lengthwise section of a buttercup seed; (*c*) capsule of violet, split open, showing seeds attached to placentae; (*d*) cross section of iris capsule; (*e*) lengthwise section of poppy seed.

with seeds having two seed leaves are called *dicotyledonous* plants. The maple, elm, oak, alfalfa and clover, besides the other plants named, are good examples of this division. Cone-bearing trees produce seeds with more than two seed leaves and form the division of *polycotyledonous* plants. One needs to know the meaning of these terms because they are frequently met with in reading botanical descriptions of plants.

A study of the arrangement of seeds in the seed vessel or fruit leads to some of the most curious and interesting facts connected with the study of plants. How many can tell the direction in which the seeds of the apple point? (See *a,* Fig. 3.) Does the pit of the peach point in the same direction? (See *e,* Fig. 3.) Notice how the seeds are arranged in the squash (*c,* Fig. 1); in the iris (*d,* Fig. 2), and in the cranberry (*d,* Fig. 3). In the blackberry (*c,* Fig. 3), they are attached to the outside of a fleshy receptacle, but each seed is enclosed in a little, pulpy fruit. In the strawberry the seed is on the outside of the fleshy receptacle. Notice the ingenious method by which the seeds are packed into these capsules or pods. By no other arrangement could the same number of

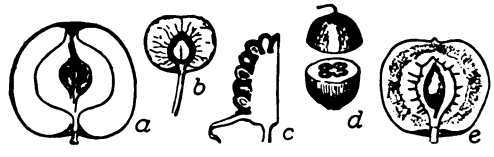


FIG. 3

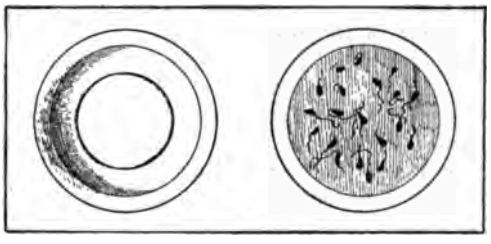
(*a*) Lengthwise section of apple, showing position of seeds in center; (*b*) lengthwise section of cherry, with seed in center; (*c*) lengthwise section of part of blackberry; (*d*) cross section of cranberry; (*e*) lengthwise section of peach, showing seed in center.

seeds be crowded into the space. Make a collection of seed vessels before they open and observe the arrangement of the seeds in each.

Seed Adulteration. The seeds of some cultivated plants so closely resemble those of worthless plants that these seeds may be mixed and no one but an expert can detect the fraud. To illustrate, the seeds of pepper grass, dodder, crab grass and sorrel may be mixed with timothy seed, and kale and mustard may be mixed with turnip seed. It is difficult to obtain pure seed for planting because weeds grow with the crop and are necessarily harvested with it. While most of the weed seeds are separated from the grain at threshing, some remain, and if sowed the next season they produce another crop of weeds. A large number of fanning mills have been invented for the purpose of enabling the farmer to obtain pure seed for planting.

Seed Testing. The importance of securing a good crop makes it advisable for the farmer to test his seed before planting. A simple device consists of two plates of the same size. Lay a piece of blotting paper in one plate, first marking it off into squares two inches in diame-

ter. Pour enough water into the plate to moisten the paper and then lay ten seeds to be tested in each square. Cover them with another piece of blotting paper or with a damp cloth, and cover this by turning the second plate over the first. Keep the blotter moist and set the plates where the temperature will be about the same as that of the soil at the time of planting. In eight or ten days the seed



SEED TESTING
A simple device for testing seeds in sand.

should have germinated (sprouted). Count the number of seeds in each square that have germinated, and you have the percentage of good seed in the lot from which the seeds were taken.

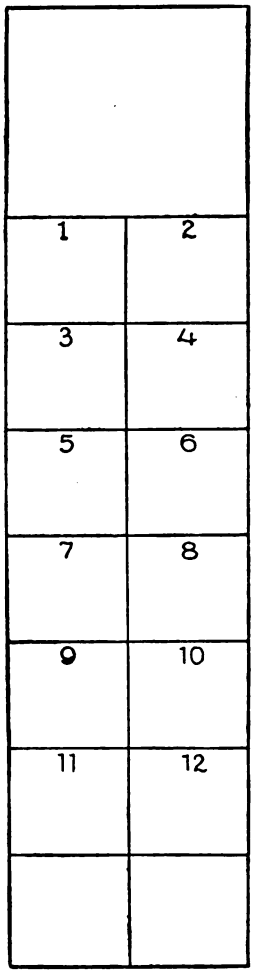
A strip of muslin, nine inches wide and a yard long, marked as shown in the cut, is convenient for testing seed corn. Test as many ears as there are squares on the cloth, numbering each ear to correspond with the square in which kernels taken from it are placed. Place a round stick on the blank end of the cloth and roll it up lightly, taking care not to disturb the kernels. Tie the roll loosely and place it in water over night, then bury in damp sawdust or sand and keep it at a temperature of 65° or 70° until the corn germinates. A box of sand marked off into squares by strings or wires is more convenient for testing a large quantity of seeds.

Use of Seeds. The purpose of the seed in nature is to reproduce the plant, and almost every plant produces a large number of seeds, but only a part of these grow. Some are eaten by birds and animals, some are destroyed by fire and other agencies, and some fall upon rocks or in water where they cannot germinate. But the greatest use of seeds is for food for man and domestic animals. By far the greater part of the food of all the people in the world consists of seeds. In America and Europe wheat, corn, rye, oats and barley are the grains most extensively grown for food. In Asia rice is the chief article of food; hence the world over, growing seeds (grain) is the chief occupation of the agriculturist. W.F.R.

Consult United States Department of Agriculture's *Year Books*, issued annually.

Related Subjects. The reader is referred to the articles on the various plants mentioned above, and to the following articles in addition:

Angiosperms
Botany
Cotyledon
Cross-Fertilization
Flowers
Fruit
Germination
Grains
Gymnosperms
Plant
Pollen and Pollination
Spore

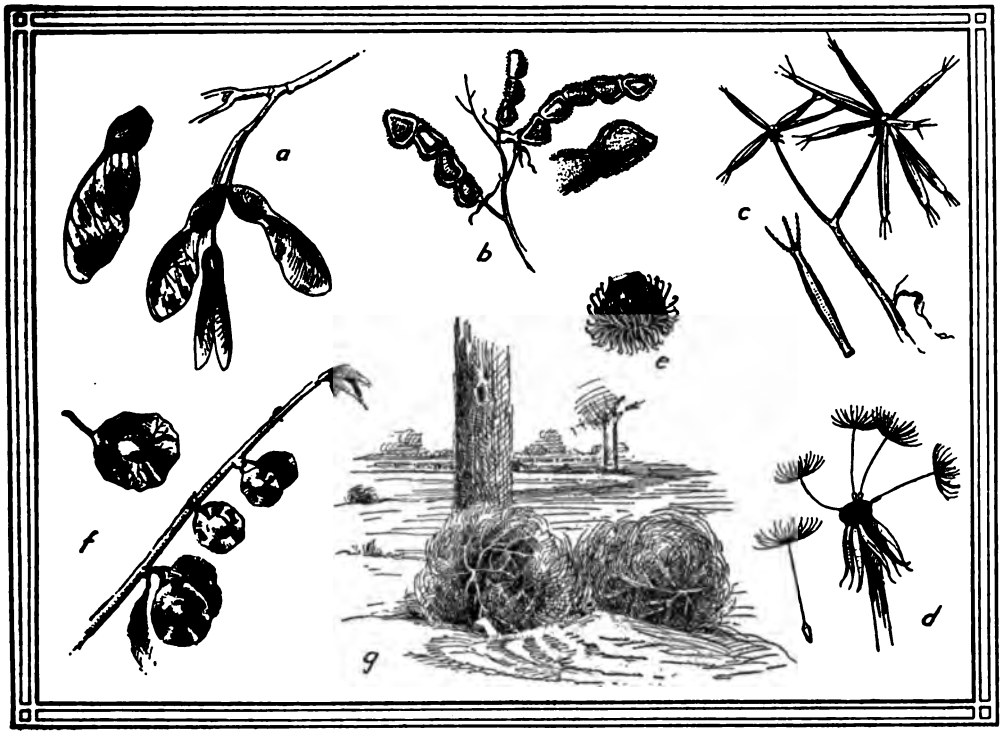


SEED TESTING
How cloth is marked.

Seed Dispersal

The fruits of many plants are constructed for the special purpose of scattering the seeds or to aid in their dispersal by wind, water and animals. The seeds themselves are fitted for long journeys and can withstand conditions that would kill most plants. Some seeds remain in good condition for long periods of time, and grain has even been grown from the seeds found in ancient Egyptian mummy cases, where it has lain for thousands of years.

The seeds of wild plants are sown in unimaginable numbers by natural agencies, each year making good the loss of vegetation due to all destructive causes. Owing to the lack of sufficiently thorough and rapid distribution, insect and plant enemies and unfavorable conditions, only a small proportion of the seeds produce new plants. When ripe, many seeds detach themselves from the fruit; others, by various devices of nature and by atmospheric



SOME OF NATURE'S MEANS OF SEED DISPERSAL

(*a*) Winged seed of the maple; (*b*) burs of "sticktights;" (*c*) seeds of Spanish needles; (*d*) dandelion seeds; (*e*) burdock seeds; (*f*) winged fruits (seeds) of American elm; (*g*) tumbleweeds blown by the wind.

conditions, are brought from their shelter at the proper time.

Dispersal by Wind. The wind is the chief agent in scattering seeds. Some dustlike seeds, like those of the orchid, float in the air, and others are provided with downy, tufted parachutes or wings. The tufted seeds of the thistle and dandelion and those imbedded in soft wool and silken hair, such as the cotton, poplar and milkweed seeds, are detached from their beds by the dry winds and warm sun and are blown long distances. The seeds of the maple, elm and ailanthus are equipped with membranous wings, and in others the fanlike petals of the dry calyx form the sails or parachutes which carry them to distant places. The wings and parachutes of some seeds become detached after the journey through the air; others remain on the seed and serve to fasten it in some favorable place for germination.

Whole clusters of fruits containing seeds, such as the white pine cone, are also blown from place to place. The smooth, light fruits of tropical plants, like the "steppe witches," are rolled for miles over the level, barren steppes until they fall into some crack in the clay or are lodged in a hole, where the seed germinates and produces a new plant. In such plants as the tumbleweed, the stalk parts from the roots when the seeds are ripe, and as the plant is blown from place to place it scatters its thousands of seeds.

Perhaps the most curious and interesting natural seed scatterers are the "sling fruits" and "catapult fruits." In the former the tissues around the ripened seeds become highly tense and burst their outer covering, which then contracts with a violent jerk, forcibly expelling the seeds as from a sling. In some plants the seeds are expelled by the drying up of the pod or the spiral twisting of the valves of the fruit. The catapult fruits, such as the light pods of the poppy and morning glory, are open at the top, and when the stalks are bent or swayed to and fro they rebound, flinging the seeds in all directions from the top of the pod.

Dispersal by Water. Water and moisture are also important agents in the dispersal of seeds. Water plants, such as the lotus and also some varieties of palms, have floating seeds contain-

ing air which buoys them up to the surface, and after floating for months they will germinate when lodged in the soil. It is believed that the uninhabited islands of the South Seas in this way have been planted with cocoa palms.

The roses of Jericho scatter their seeds, not when the winds are dry, but in moisture and rain. The tightly curled fruits are untwisted and opened by dampness; the seeds are then washed out by the rain. The capsules of the ice plants are similarly opened by the rain, and another interesting action of moisture in the distribution of seeds is seen in the hopping or creeping fruits of the plants of the hot plains. These fruits have a stiff bristle projecting from one side, which changes its position with atmospheric changes, thus propelling the fruit by causing it to hop or spring along the ground.

Dispersal by Animals. Other seeds are designed to be carried by animals. The fruits are provided with sharp spikes, hooks or claws which catch in the animal's fur or man's clothing. These burs are sometimes like the catapult fruits thrown at the passing animal by the swaying plant. The stalks of some plants are claws, and, carrying the seed with them, cling to any rough surface with which they come in contact.

The seeds of edible fruits also are widely scattered by man and animals. The fruits of the wild cherry, currant and raspberry are often carried long distances by birds. They are then eaten, and the seed either dropped to the ground or later expelled from the crop. This explains how wild cherry and apple trees spring up in woods and meadows and how bittersweet and berry bushes come to grow in the forks of trees. Migratory birds carry seeds in the mud which clings to their claws when they are startled into flight. Nuts are carried to new places by squirrels and other animals, which bury them and often leave them to germinate the following spring.

Even if wind and water fail in effecting a wide dispersal, seeds are always scattered within short distances, thus insuring the perpetuity of the plant. So wonderfully constructed are a few plants that if pollination does not take place and the flowers produce no seeds, fruits producing seeds which germinate are formed underground and a new plant springs up in the place occupied by the old plant in the preceding year. E.B.P.

Consult Beal's *Seed Dispersal;* Morley's *Seed-Babies.*

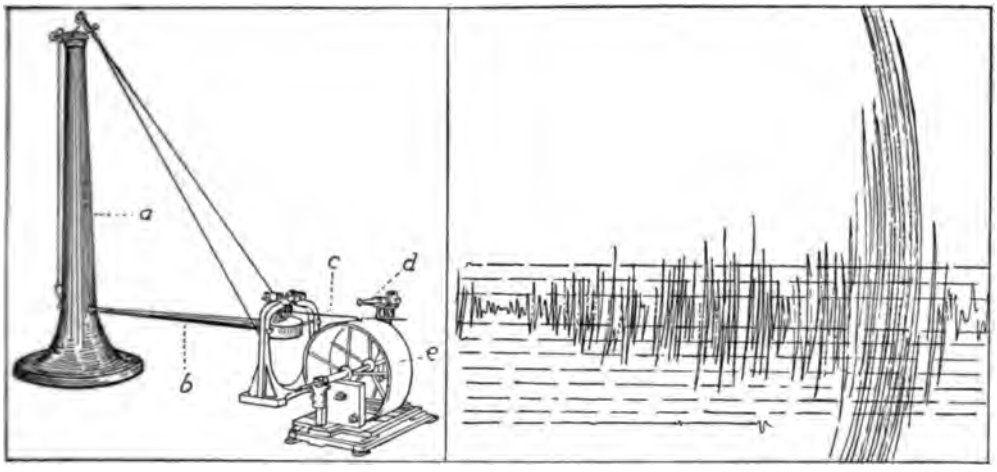
SEE'LAND. See ZEALAND.

SEIDL, *zi'd'l,* ANTON (1850-1898), an Hungarian musical conductor, born at Budapest, was trained in the Leipzig Conservatory. At the age of twenty-two he was considered such an accurate musician that Wagner called him to Bayreuth, Germany, to be one of his copyists. Seidl became an intense admirer of Wagner and assisted in the first of the famous Bayreuth Festivals in 1876. A little later the composer recommended him as conductor of the Stadt theater of Leipzig, and there until 1882 he brought forth the greater German operas in a manner that won him fame. In June, 1882, he presented Wagner's *Trilogy* in London and roused to enthusiasm an audience previously rather indifferent to Wagnerian work. In 1885 he succeeded Leopold Damrosch as conductor of German opera in New York and during that year his orchestra attained such fame that he could fill only a small portion of the engagements offered. He became a conductor at Bayreuth in 1896, but soon returned to New York, where he died on March 28, 1898.

SEIDLITZ POWDERS, *sed'lits pou'derz,* a laxative, fizzing preparation, consisting of two separate powders which are taken together. They are usually put up in blue and white papers, the blue containing tartrate of soda and potash (Rochelle salts) with bicarbonate of soda, the white one containing tartaric acid. The powders are dissolved separately in two half-filled tumblers of water, and one solution is then poured into the other. Effervescence begins immediately, and the draught should be taken at once. The powders give better effects when taken on an empty stomach; they produce a gentle, relieving action of the bowels. The name comes from that of a town in Bohemia, where a mineral water with similar effects is found.

SEIGNIORIAL TENURE, *se nyo'ri al ten' ure,* a system of feudal tenure of land which prevailed in Quebec for nearly two centuries. It was instituted by the great Cardinal Richelieu, who patterned it after the French feudal system. Large grants of land, called *seigniories,* were bestowed upon men of high position. These *seigneurs,* or *seigniors,* granted parcels of land to *censitaires,* who in turn bestowed smaller grants upon the *habitants* (see CANADA, page 1122). Each of these classes of grantees paid rentals or fees and sometimes even personal services to the overlords. So long as population was sparse, there was little complaint, but gradually there arose great discon-

tent among the tillers of the soil over the fact that they could not own the land. Some seigneurs and censitaires, moreover, took all they could get from the habitant, whose life was often a hard one. The system of seigniorial tenure was always an obstacle to the development of an independent farming class. Especially after the beginning of the nineteenth century the agitation for its abolition grew in force. For half a century it was the chief political issue, aside from the demand for responsible government, in Lower Canada. Finally, in 1854, seigniorial tenure was abolished by the McNab-Morin ministry. The seigneurs were recompensed for the surrender of their rights, almost the entire expense being borne by the government.



THE SEISMOGRAPH AND ITS RECORD

The instrument is described as follows: (*a*) support; (*b*) pendulum; (*c*) recording lever; (*d*) electric time marker; (*e*) record cylinder. At the right is a picture of a record cylinder which has recorded an unusual disturbance somewhere on the earth's surface. The delicate adjustment of the instrument makes possible a record of the smallest tremor as well as of a severe quake.

SEINE (in English, *sayn*) is the river in France upon whose banks lies the city of Paris. As a trade route the Seine is first among the rivers of France, for in normal years it carries over 10,000,000 tons of freight for Paris alone. Rising in the department of Côte-d'Or, at an elevation of 1,500 feet above the sea, it flows with many windings in a northwesterly direction, dividing Paris into two parts and finding an outlet in the English Channel 250 miles in a direct line from its source. Because of its many curves, the river is actually 472 miles in length.

Its mouth is a spacious estuary, on which is situated the city of Havre. Large sums of money have been spent to enhance the commercial value of the Seine. Locks have been constructed between Paris and Rouen, a canal runs parallel with the river between Marcilly and Troyes, and the stream has connections with the Loire, the Rhone, the Rhine, the Meuse and the Scheldt by means of canals and its tributaries. Of the latter the most important are the Oise and the Meuse. There is also a canal skirting the north shore of the estuary, between Havre and Tancarville. The Seine at times overflows its banks, and Paris has on several occasions suffered from floods. One occurring in January, 1910, caused great damage to property.

SEISMOGRAPH, *sys'mo graf,* a word derived from the Greek *seismos,* meaning *an earthquake,* and *graphein,* meaning *to write.* The term is applied to a machine which "writes about" or records the occurrence of an earthquake and indicates its force and direction. It is unfailing in announcing such a disturbance, but of course gives no hint as to the section affected except from the violence of the recorded movement the possible distance away can sometimes be inferred with considerable accuracy.

The most efficient form of seismograph consists of a delicately-suspended pendulum which remains stationary while the earth's crust is moved even very slightly by earthquake shocks. A pen or pointed instrument is attached to the pendulum and records on smoked glass the movements of the earth. A highly sensitive seismograph is produced by suspending a non-magnetic needle by means of silk or quartz

fiber. A point of light is reflected from the needle on photographic paper, black, zigzag lines appearing when the photograph is developed. Modern seismographs are so delicately adjusted that scientists in any part of the world are able to study and record earthquakes occurring at any other point on the globe. Quite often shocks are recorded of which the world never hears particulars; such occur in islands remote from civilization or under water near coasts. See EARTHQUAKE; VOLCANO.

Consult Milne's *Earthquakes and Other Earth Movements;* Dutton's *Earthquakes in the Light of the New Seismology.*

SE'LAH, a Hebrew word of uncertain origin occurring seventy-one times in the *Psalms,* as well as in *Habakkuk* III, 3, 9 and 13, and retained in the English authorized version of the Bible. It is supposed to indicate a pause or natural break in a hymn. One authority has suggested that it is a direction to the singers to "lift up their voices."

SELECT'MEN, the chief executive officers of the New England town, corresponding to aldermen of a city or councilmen of a village. They are usually elected annually and serve for one year, although in Massachusetts they are elected for three years, one being chosen each year. The number of selectmen varies from three to nine, according to the population, but the usual number is three.

The selectmen compose the administrative board of the town and put into effect the instructions they receive from the town meeting. They conduct the more general affairs of the town, as minor officers are elected for specific duties. They have limited appointive powers and may fill vacancies in town offices. They are sometimes paid salaries, but more often receive only the equivalent of the expenses of the office. The name is not employed in any state west of New England, nor in any other country than the United States.

SELF-DENY'ING ORDINANCE, *awr'di nans,* an enactment passed by the British Parliament in 1645 which required all members of that body to resign who held any civil or military office during the civil war between Charles I and Parliament. The ordinance was named from the remark made by Cromwell that "all Parliament members should deny themselves and their private interests for the public good." This measure had a twofold object: first, the removal of inefficient commanders, and the substitution of vigorous men that the times demanded for the remodeled army; second, to give the control of the army to the radical Independents, rather than to the Presbyterians. The lords finally passed the measure, with alterations, after a new army had been formed by the commons with Cromwell as lieutenant-general of the cavalry and Sir Thomas Fairfax general-in-chief. Cromwell was made an exception to the new ruling. See CROMWELL, OLIVER.

SELJUKS, *seljooks',* the Turkish dynasty with which the nations of Christian Europe came into conflict during the period of the Crusades. The cruel treatment of Christian pilgrims on the part of the Seljuks is described in these volumes under the heading CRUSADES. This dynasty established itself in Syria and Asia Minor in the latter part of the eleventh century, setting up several independent sultanates. The last of these sovereignties endured until the close of the thirteenth century, and out of its ruins the present Ottoman Empire rose. It was during the period of Seljuk supremacy that Omar Khayyam (which see) lived. See TURKEY, subtitle *History.*

SEL'KIRK, a town in Southern Manitoba, on the Red River, near its mouth. It is twenty-four miles north of Winnipeg, with which it is connected by an electric line and by a branch of the Canadian Pacific Railway. Selkirk is at the head of navigation for steamers on Lake Winnipeg, and is the center of the fishing industry on the lake. It is estimated that about 7,000,000 pounds of fish are shipped from Selkirk each year. In addition to several large cold-storage plants, the chief industrial establishments are a saw and planing mill, box factory, pulp and paper mill, iron rolling mills and a nut and bolt factory. The government maintains a shipyard and dry dock. The Selkirk district is famous for the fertility of its soil, and because of its proximity to Winnipeg is admirably suited to dairying and the cultivation of fruits and vegetables. Population in 1911, 2,977; in 1916, 3,399.

SEL'KIRK, ALEXANDER (1676-1723), a Scotchman whose experiences as a castaway on a lonely island are said to have inspired the story of Robinson Crusoe (which see). While sailing in the South Sea on a freebooting expedition he had a quarrel with the captain of the ship, and at his own request was left upon the island of Juan Fernandez, 360 miles west of Valparaiso, Chile (1704). Here he remained in solitude for four years and four months, until rescued by Captain Rogers of the British navy. Selkirk died on board the *Weymouth,*

of which he was at the time lieutenant. His experiences on the island were recorded in two books of the sea published in 1712, and Defoe's *Robinson Crusoe* is believed to have been based on these accounts. Selkirk's exile also inspired a poem by William Cowper—*Imaginary Verses of Alexander Selkirk*—containing the familiar lines:

I am monarch of all I survey—
My right there is none to dispute;
From the center all round to the sea,
I am lord of the fowl and the brute.

For illustration of the Selkirk monument on the island of Juan Fernandez, see page 3177. Consult Howell's *Life and Adventures of Alexander Selkirk.*

SELKIRK, THOMAS DOUGLAS, Fifth Earl of (1771-1820), a Scotch philanthropist and colonizer, founder of the Red River settlement, out of which grew the Canadian province of Manitoba. The earl was born in Kirkcudbrightshire, Scotland, and was educated at the University of Edinburgh. About 1800 he became deeply interested in the hard lot of hundreds of Scotch peasant-tenants who were evicted from their farms. In 1803 he sent forth three shiploads of such unfortunate families to found a settlement on Prince Edward Island. This colony was so successful from the start that he founded a second colony, Baldoon, in the western part of Upper Canada.

In 1811 he proceeded on a larger scale to found a third settlement, in the valley of the Red River. He bought from the Hudson's Bay Company 116,000 square miles of land. The first settlers reached their destination in the spring of 1812, and by the end of the third year there were about 300 settlers. They spent the winters at Pembina hunting buffalo, and each spring returned to the junction of the Assiniboine and Red rivers to sow their little patches of grain. Their presence was obnoxious to the factors and traders of the Northwest Company, for the latter suspected that Lord Selkirk, being a shareholder in the Hudson's Bay Company, had planted a colony to interfere with the Nor' Westers' trade. Actual hostilities were not infrequent, and in one of these pitched battles Governor Semple (see SEMPLE, ROBERT) was killed. As a result of this defeat the settlers were driven northward to the head of Lake Winnipeg. Selkirk, who had meantime arrived in Canada, with a force of soldiers restored the ejected colonists to their farms, settled his soldiers in the vicinity and made a treaty of friendship with the Indians.

When news of this situation reached England, both parties to the quarrel were ordered to surrender all their property. Selkirk was unable to secure the conviction of any of the murderers of Governor Semple, and was himself heavily fined on a charge of violence. Bitterly disappointed and broken in health, Selkirk then withdrew to France, where he died. In the year after his death the rival trading companies were combined, and thereafter the settlement of Fort Garry, as it was known, made steady if sometimes arduous progress. It has developed into the city of Winnipeg.

SELKIRK MOUNTAINS, a mountain range in the southeast part of British Columbia, extending from the United States boundary to the Columbia River. The Selkirk Mountains are famous for their great glaciers, for heavy snowfall, and for wild, magnificent scenery. Though not as lofty as the neighboring chain of the Rocky Mountains, the Selkirks are more Alpine in character and far more beautiful. The lower slopes, particularly on the west, are heavily wooded, and higher up are countless glaciers, some of enormous size. One of the greatest of them is the Illecillewaet, near the Glacier House station of the Canadian Pacific Railway. This glacier has its origin in the perpetual snow and ice on the mountains to the south, including Mount Sir Donald (10,645 feet), named for Lord Strathcona. The highest peak in the range is Mount Sir Sandford (11,634 feet), named for Sir Sandford Fleming. The beauty of the Selkirks has given this section of the Dominion its nickname, "the Switzerland of America."

The Selkirk Mountains have a length of about 200 miles, and a width of about eighty miles. The range is almost completely encircled by the Columbia River and its tributary, the Kootenay. Though usually regarded as a part of the Rocky Mountains system, it belongs to an older geological period, and is separated from the greater system by the long, narrow Rocky Mountain Trench. Directly southeast of the Selkirks is a minor chain, called the Purcell Range, and farther east the main chain of the Rockies. West and north of the Selkirks is the Gold Range. Gold was discovered in this section in 1857, and silver, copper, zinc, mercury, coal and marble have also been found. Gold mining has reached the stage of the lode mining on a fairly large scale. The Selkirk Mountains were named in honor of Thomas Douglas, Earl of Selkirk (see SELKIRK, THOMAS DOUGLAS, EARL OF). A.P.C.

SEL'MA, ALA., the county seat of Dallas County, and a thriving industrial center, is situated west and south of the center of the state, fifty miles west of Montgomery, the state capital, and 162 miles northeast of Mobile. It is on the Alabama River, which permits weekly steamer service to Mobile, and is on the Louisville & Nashville, the Southern and the Western of Alabama railroads. In 1910 the population was 13,649; it was 15,626 (Federal estimate) in 1916, about evenly divided between whites and negroes. The area of the city exceeds three square miles.

Prominent features of the city are the Dallas Academy, the Alabama Baptist Colored University, the Alabama Methodist Orphanage, Y. M. C. A. building, Carnegie Library, Federal building, completed in 1908 at a cost of $150,000, the courthouse and the Vaughn Memorial Hospital. Cotton is the chief crop of the rich agricultural section of which Selma is the commercial center. The city's average yearly cotton receipts are 125,000 bales. It has a large wholesale trade, cotton mills, cotton-seed-oil mills, the Southern Railroad shops, lumber plants and machine shops.

Selma was founded in 1820. During the War of Secession it was an important Confederate military base, and was captured by Federal troops in 1865. M.R.

SEL'VAS, extensive woodland plains of the Amazon Valley in South America, covered with the densest vegetation on the globe. They extend from the northern part of Brazil to the Southern part of Venezuela, and occupy the lowlands where abundant rains fall most of the year. In the selvas are found rubber, bamboo, rosewood, Brazil-nut, cacao, wax-palm and many other kinds of trees, all bound together with thick tangles of cacti, orchids and creeping vines. From this immense forest Brazil exports great quantities of rubber and various kinds of valuable wood. See BRAZIL, subhead *The Great Forests and the Rubber Industry.*

SEMBRICH, *zem'briK,* MARCELLA (1858-), an operatic singer, whose real name is MARCELLINE KOCHANSKA, was born at Wisniowczyk, Poland. She was educated in music at Vienna, with Wilhelm Stengel as teacher, and he subsequently became her husband. Her first appearance in opera was at Athens in 1877, when she sang in *I Puritani* with such success that musical critics advised her to prepare for German grand opera. This she did at Berlin, and from 1878 to 1880 was engaged as one of the leading sopranos in the Dresden court theater. During the next five years she became celebrated through her frequent concert tours of England and America. In the latter country she received many remarkable ovations and was rivaled in popularity probably only by Patti. Since 1889 she has made Dresden her permanent home, but has continued her public work, largely in recitals, in Europe and America. Her voice is notable for the extraordinary shading and vigor it displays in a great variety of songs.

SEMELE, *sem'e lee,* in the Greek myth, a beautiful daughter of Cadmus. She was wooed and won by Jupiter in the guise of a mortal, but the jealous Juno, taking the form of Semele's nurse, induced her to ask of Jupiter that he appear before her in his divine glory. First she extracted from Jupiter a promise to grant any favor to her she might ask, and then she made her request. In vain the king of the gods protested; Semele was firm, and Jupiter at last was obliged to yield to her entreaties. He donned only his mildest glory, but even this was too much for the mortal eyes of Semele, who was burned to death in the blaze of light which surrounded him. Bacchus, her son, was caught up by his father and saved from destruction.

SEMINOLE, *sem'i nohl,* a tribe of Indians belonging to the Muskhogean family, famous for the stubbornness with which they resisted attempts of the American government to force them out of their Florida home. Their troubles with the United States began in 1817, when General Andrew Jackson invaded their territory, which was then a Spanish possession. Two years later Florida was purchased by the United States. In 1832 a treaty was concluded whereby the Seminoles agreed to remove beyond the Mississippi, but several thousand of the tribe under the leadership of Osceola (which see) disregarded the treaty and began war against the United States. A terrible conflict followed, lasting seven years (1835-1842) and costing the government $10,000,000 and thousands of lives. Eventually the Indians were conquered. The majority removed to Oklahoma, where their descendants, who are now American citizens, number about 1,500. A few hundred have been living in the Everglades of Florida, but the government is planning to place them on a small reservation because of the drainage operations in the swamps.

Consult Wilson's *The Seminoles of Florida.*

Related Subjects. An illustration of a present-day Seminole Indian and his bride appears

on page 2217. The reader is referred to the following articles in these volumes:

Everglades	Jackson, Andrew
Florida (History)	Muskhogean

SEMIRAMIS, *se mir'a mis,* a legendary queen of Assyria, whom tradition has made the founder of Babylon and the conqueror of Persia and Egypt. The story goes that she was the daughter of a fish goddess and a Syrian youth, and that when her mother abandoned her she was fed by doves. Rescued by the leader of the king's shepherds, she grew to be a beautiful woman, and finally became the wife of King Ninus of Assyria. After her husband's death she entered upon a spectacular career of conquest, but in the forty-second year of her reign she was deposed by her son and disappeared. Herodotus mentions a queen of Babylonia named Semiramis who lived in the eighth century B. C., and the stories of the legendary queen are probably a combination of fact and fable.

SEMITES, *sem'ites,* a group of peoples constituting one of the three main divisions of the white race, the others being the Hamitic and the Aryan. The term *Semitic* comes from *Shem,* the name of one of the sons of Noah, and the classification mentioned above is based on that given in the tenth chapter of *Genesis.* Though the Bible classification is inaccurate, the name Semitic has been retained for convenience. In the Semitic group are included the Hebrews (Jews), Assyrians, Chaldeans, Phoenicians, Carthaginians, Arabians, Ethiopians and various other peoples of similar physical and intellectual traits. It is an interesting fact that the three great religions which acknowledge one supreme deity—Judaism, Christianity and Mohammedanism—had their origin with Semitic races. It was also from a Semitic people—the Phoenicians—that our alphabet came.

The Semitic Languages are usually divided into the northern and southern groups, the former including the ancient dialects of Assyria and Babylonia, and the Hebrew, Phoenician and Aramaic tongues. Of all of these, Hebrew is practically the only one that has survived as a spoken language. The Assyrian and Babylonian languages have been preserved as literary monuments of the past by means of the curious wedge-shaped writings known as cuneiform inscriptions (which see). To the southern division belong the Arabic and the Ethiopic languages, the latter being the old church language of Abyssinia. The greatest literary achievements of the Semites are the Bible and the Mohammedan *Koran.*

Related Subjects. The reader who is interested in this subject is referred to the following articles in these volumes:

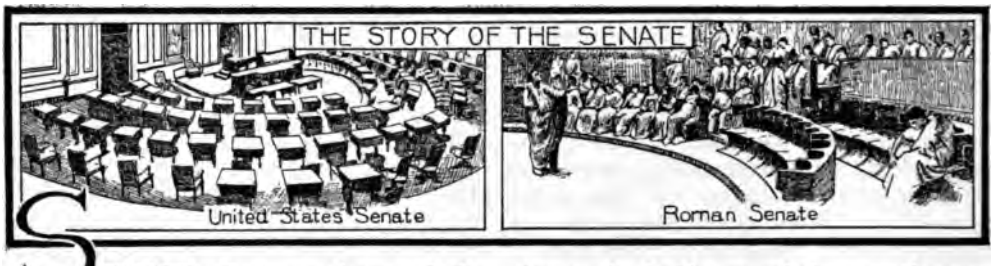
Alphabet	Hebrew Language and Literature
Christianity	Jews
Cuneiform Inscriptions	Mohammedanism

SEMMES, *semz,* RAPHAEL (1809-1877), an American naval officer who commanded the *Alabama,* the most famous Confederate vessel in the War of Secession. He was born in Charles County, Maryland. When Alabama seceded he entered the service of the South, was assigned to the command of the *Sumter,* the first war vessel of the Confederate navy, and began cruising in the West Indies for the purpose of capturing Northern merchant vessels. After the completion of the *Alabama,* which was built in England and secretly sent to sea in 1862, Semmes was made its captain, and in all he captured sixty-seven merchant and whaling ships. After this destructive career, the *Alabama* was sunk in the English Channel in a fight with the United States *Kearsarge,* under Captain Winslow, on June 19, 1864. Semmes was later placed in charge of the James River squadron, and after the war was imprisoned. Having been liberated through the general amnesty order, he devoted himself to the practice of law and for a time was professor of moral philosophy in a seminary at Alexandria, La. His writings include *Service Afloat and Ashore, Cruise of the Alabama* and *Campaign of General Scott in the Valley of Mexico.* See ALABAMA, THE.

SEMPLE, *sem'p'l,* ROBERT (1766-1816), a Canadian traveler and governor under the Hudson's Bay Company, who played a brief but prominent rôle in the development of the Northwest. Semple was born at Boston, Mass., but early in life became a wanderer in mercantile pursuits, and between 1803 and 1815 he appeared in turn in South Africa, London, Portugal, Spain, Italy, Turkey, again Portugal and Spain, and finally in Venezuela. In 1815, through the influence of the Earl of Selkirk, he was appointed governor of Rupert's Land for the Hudson's Bay Company.

At the time of Semple's arrival in the Northwest there was considerable bitterness between the employees of the old Northwest Company and the Selkirk settlers in the Red River Valley. The Nor' Westers, knowing that Lord Selkirk was a shareholder in the Hudson's Bay

Company, suspected that the real object of the colony was to interfere with the Canadian company's trade. While Semple was away on a tour of inspection, one of his assistants destroyed Fort Gibraltar, a Northwest Company post half a mile from the settlement. The Nor' Westers prepared to retaliate, and on the nineteenth of June a body of them on horseback were seen to approach Winnipeg. At a spot now marked by the Seven Oaks Monument Semple, with a small party, met the Nor' Westers in a pitched battle which cost Semple's life. See SELKIRK, THOMAS DOUGLAS, for the final result of the struggle.



SEN'ATE, the upper house of the Congress of the United States or of a state legislature, and of the Parliament of Canada. The term is also employed variously in Scotland, France, Belgium, Brazil, Chile, Italy and Mexico.

The word *senate* was first used in ancient Rome. Its literal meaning was *council of old men,* so named because it was an assembly composed of the heads of leading families. Romulus was the first to organize a senate, and he selected 100 patricians for his advisors. Under the Republic of Rome the Senate was composed of 300 patricians, plebeians and high officials. Julius Caesar raised the number of senators to 900, and Augustus decreased the number to 600. In the last two years of the Republic, the Roman Senate was in the time of its greatest power. It exercised legislative and judicial functions which included authority over religion, finance and diplomacy, but its brilliant career was rapidly curtailed. Political scientists consider that at one time the Roman Senate came near to fulfilling the highest ideal of reasonable, far-seeing government.

United States Senate. The national legislative body is patterned somewhat after the Parliament of Great Britain. Of the two houses composing it the Senate is comparable to the House of Lords in respect to its dignity and importance, although differing in organization and tenure of office of members. The Senate is composed of two members from each state, each chosen for a term of six years by popular vote of the people of the state. Previous to 1912 the whole body of people had no voice in the choice of Senators, their election having been intrusted by the terms of the Constitution to the legislatures of the several states. This rule of over one hundred years was terminated by the adoption of the Seventeenth Amendment.

The Senate of the United States is a continuous body, that is, since its organization in 1789 there never has been a time when among its members two-thirds of them had not sat in the preceding Congress. The Constitution ordained that the terms of service of one-third of the members should expire every two years. This provision leaves always a working majority of members of experience. An exactly opposite condition is possible in the House of Representatives, where the terms of all the members expire together, although in practice the House always contains a large number of men who have seen years of continuous service by reëlection. For salary of a Senator, see CONGRESS OF THE UNITED STATES, subhead *Salaries.*

Duties of the Senate. The Senate and House of Representatives are coördinate bodies in the making of laws, and, with the exception of bills for raising revenue (tariff bills), any bill may originate in either house. Upon the Senate obligations are imposed in which the House does not share. The Senate must approve appointments of the President to office in the civil, military and diplomatic service; it must approve all treaties made by the President on behalf of the United States and foreign countries; it is a tribunal for the trial of impeachments and in such case sits as the jury.

Officers. By constitutional provision the presiding officer of the Senate is the Vice-President of the United States. As long as the President is capable of performing the duties of his office

the Vice-President's services are limited to his chairmanship in the Senate. Not being a member of the Senate, but placed there through election in which the Senators have no choice, he has no part in the deliberations of that body and has no vote except in case of tie. The Vice-President may at any time be obliged to leave the Senate to assume the duties of the Presidency; also he may be unavoidably absent from sessions. Therefore the Senate provides from its own membership a president *pro tempore* who must hold himself in readiness to preside in place of the Vice-President. This president *pro tempore* receives the same salary as the Vice-President, $12,000, and retains his right to speak and vote.

The secretary of the Senate is responsible for the official conduct of the clerks and all subordinates, except doorkeepers. He is also disbursing officer, and in such capacity pays the salaries and mileage of senators and employees. His salary is $5,000. The sergeant-at-arms has charge of the entire Senate wing of the Capitol and all employees not on the floor of the Senate, and when necessary maintains order and discipline during rare turbulent periods. He is responsible for the care of all halls and rooms belonging to the Senate and of all the property they contain. His salary is $4,500. The chaplain opens with prayer each session of the Senate. Laborers and pages receive $720 to $1,000, ordinary clerks and messengers $1,440, and committee clerks $1,800 to $3,000. A group of skilled stenographers reports the proceedings of the Senate for publication in the Congressional Record, and each receives $5,000 per year.

Canadian Senate. The Senate of Canada is described on page 1117 in these volumes, in the article CANADA, subtitle *The Dominion Government*. E.D.F.

Related Subjects. The reader is referred to the following articles in these volumes:

Congress of the United States	Parliament
	Reichstag
Constitution of the United States, subhead *Amendments*	Vice-President

SENECA, *sen'e ka,* a North American Indian tribe of Iroquoian stock, which ultimately became the most important element in the confederacy known as the Five Nations (which see). When the white men first came in contact with them, the Senecas were settled in Western New York between Seneca Lake and the Genesee River. They fought fiercely against the Neutral Nation and the Erie, and absorbed the remnants of these tribes after conquering them (about 1650). They then spread out along the country west of Lake Erie and south along the Allegheny River to Pennsylvania. During the Revolutionary War the Senecas supported the English. About 2,500 live on reservations in New York, and a few others are in Oklahoma and in Ontario on the Grand River Reservation.

SENECA, LUCIUS ANNAEUS (about 4 B.C.-A.D. 65), a Roman philosopher who taught the doctrine of the Stoics—that virtue is the highest aim in life. His extant philosophical writings are moral treatises on such subjects as *Consolation, Providence, Tranquillity of Mind* and *A Happy Life*. Ten tragedies are also attributed to him. These are not in themselves of great value, but they had an important influence on the drama of the Renaissance. Seneca was born in the province of Spain, at Cordova. After studying under the Stoic philosopher Attalus, he traveled in Greece and Egypt, gained a reputation in the law courts for his eloquence, and rose to the position of quaestor under the Emperor Claudius. In the year 41 he was banished to Corsica, but eight years later was recalled to Rome by the Empress Agrippina and made the tutor of her son Nero, who became the next emperor. Though Seneca for a few years exerted a good influence on his wilful pupil, eventually he lost all control over him, and in 65 Nero ordered the philosopher to commit suicide. As a philosophical writer Seneca is admired not so much for depth of thought as for breadth of view and his sympathetic way of treating moral problems.

SENECA

Consult Dimsdale's *History of Latin Literature;* Summers' *Select Letters of Seneca.*

SENECA LAKE, the largest of the group of lakes in New York known as the Finger Lakes. It is noted for its beauty and is a favorite sum-

mer resort, Cayuga Lake Park being a prominent attraction. The lake is thirty-seven miles long and one to four miles wide; its greatest depth is about 600 feet, and it lies about 450 feet above sea level. It is fed by the waters of Keuka Lake, discharges through the Oswego and Seneca rivers into Lake Ontario, and is connected also by canals with the Erie Canal and Chemung River. It receives its name from the Seneca Indians, a powerful tribe who inhabited the district in early days.

SENEGAL, *sen'e gawl,* an important French colony in West Africa, between the rivers Senegal and Gambia. The inhabitants are chiefly Berbers and various Negroid races, numbering altogether about 1,800,000 (see RACES OF MEN). Polygamy is extensively practiced, though the French authorities strive to suppress it. The climate is hot and unhealthful for Europeans. There are two seasons, wet and dry; the dry season is fairly healthful, but during the wet months yellow fever, malaria and other diseases are prevalent.

The principal products are cocoanuts, rubber, raisins, millet and maize, mostly for local needs, as there are no manufactures, and the commerce is unimportant. Lions, leopards, cheetahs, wild boars and hyenas are numerous, and crocodiles swarm in the upper portions of the Senegal River. Monkeys of many varieties abound in the forests, and antelopes and gazelles are found in herds on the plains. Gold, iron and quicksilver are exported, and the natives have large flocks of sheep and goats besides many camels and horses. The capital is Saint-Louis, which is connected by railway with Dakar and Rufisque, the two towns next in importance. The principal tree of the territory is the baobab, which has sometimes a circumference of over one hundred feet at twenty feet from the ground.

SENEGAL, a West African river which gives its name to the French province of Senegal, on the southwestern border of the Sahara Desert. The Senegal rises near the sources of the Niger, in the mountains of Futa Jallon, and after a course of nearly 1,000 miles discharges its waters into the Atlantic Ocean 110 miles north of Cape Verde. The upper course of the river is marked by many rapids, but near the coast the stream becomes deep and sluggish, coasting vessels navigating to a distance of about 450 miles inland.

The river has two notable and picturesque falls, named Guine and Felu, each about fifty feet in height. The basin drained by the Senegal is hot and unhealthful, and the soil is for the most part unfertile, except where it is covered with forest and rank jungle growth. The river does not discharge its waters direct into the sea, but flows into a lagoon which is separated from the sea by a shifting bar of sand which is extremely dangerous to shipping.

SENEGAMBIA, *sen e gam'bi a,* a name formerly applied to the territory between the rivers Senegal and Gambia, on the west coast of Africa. It is now known as Senegal.

SEN'NA. See CASSIA.

SENNACHERIB, *seh nak'er ib* (? -681 B.C.), a king of Assyria, the son of Sargon II, whom he succeeded in 705 B.C. His conquests included parts of Medea, Sidon, Ashkelon, Ekron, Tyre and Aradus, and he was successful in suppressing frequently threatening revolt in Babylonia. He also carried on war against Hezekiah, king of Judah, and Hezekiah was forced to pay him a heavy tribute, as related in *II Kings* XVIII, 13, though in XIX, 35 it is recorded that the strength of Sennacherib was cut down by the angel of the Lord, and that, as a result, he withdrew his forces, never to trouble Hezekiah again. He destroyed Babylon completely, but was soon afterwards murdered by two of his sons. The palace of Koyunjik was one of the most magnificent structures erected by him.

The destruction of so large a part of his army and the liberation of the Hebrews is described in Byron's *The Destruction of Sennacherib,* ending with this stanza:

And the widows of Ashur are loud in their wail,
And the idols are broke in the temple of Baal,
And the might of the Gentile, unsmote by the sword,
Hath melted like snow in the glance of the Lord!

Consult Johns' *History of Assyria;* Smith's *History of Sennacherib.*

SEN'SES, SPECIAL. We see, we hear, we taste, we smell, we feel, we experience sensations of heat and cold, hunger and thirst, fatigue and pain. We are made aware of these sensations through the sensory nerves, which, when properly acted upon, convey impulses to the brain, where they are interpreted. Those senses which bring us knowledge of the world about us—sight, hearing, smell, taste and touch —are called *special senses,* and those that make us aware of our bodily needs are commonly known as *general sensations.* Chief among these are the sensations of temperature, hunger, thirst, fatigue and pain, the last a warning that some organ is failing properly to perform its functions.

The special sensations differ from general sensations in the following particulars:

(1) The nerves of the special senses all end in special organs, as the eye, ear and nose. The nerves producing general sensations do not.

(2) Special senses tell us of the outside world; the general senses tell us of conditions within the body.

(3) Special senses are more exact; we can locate an object by sight and easily determine the source of a sound, but we are often at a loss to locate the cause of a pain.

(4) The meaning of each special sensation must be learned by experience, but the ability to interpret the meaning of general sensations is inherited. The child may not be able to tell a bumblebee from a wasp, but he can distinguish between toothache and stomach ache.

(5) The special senses are important avenues of knowledge, and without them the mind would never awaken to activity. The general sensations are an aid to health. They tell us when we need food and drink, when we need exercise or rest, and warn us against overindulgence in eating, drinking and exercising. W.F.R.

Related Subjects. Further information on this subject will be found in the following articles:

Brain	**Nervous System**	**Smell**
Ear	**Nose**	**Taste**
Eye	**Skin**	**Touch**
Fatigue		

SENSITIVE, PLANT, a small herb belonging to the same family as the pea, so called because the small leaflets which compose its leaves fold over each other in pairs when the plant is shaken or roughly touched. At the same time each of the leafstalks bends toward the main stem, as if the plant were shrinking from the intruder. If the plant is then left undisturbed the leaves will slowly assume their normal position. The sensitive plant is a native of South America, but has been introduced into the United States, where it is sometimes cultivated in greenhouses as a curiosity. The sensitive brier, which grows wild in the Southern states, has the same habit of withering, but does so only when it is very roughly handled.

SENTENCE, *sen'tens.* When two or more words are joined in such a way as to make sense, they form a *sentence.* Thus, it is the sentence, not the word, that is the true unit of speech. A word pictures a single idea, but it requires a group of words arranged in definite, grammatical order to express *a complete thought.* For instance, the word *bells* tells us nothing of the speaker's thought until it is combined with one or more other words: as, "Bells ring;" "The great bells in the tower were cast over a hundred years ago."

Capitalization and Punctuation. The first word of a sentence is always capitalized, and the close of the sentence is indicated by a period, a question-mark or an exclamation point. The punctuation used in the body of the sentence is an important factor in its construction, particularly if it is lengthy, for correct punctuation helps the reader to make a swift mental analysis and to decide which elements belong together and which do not. See PUNCTUATION.

Parts of a Sentence. The two essential parts of a sentence are the *subject* and the *predicate.* The subject, which is always a noun or its equivalent, names the person or thing of which something is said; the predicate embodies what is said about the subject. No matter how long and complicated the subject or the predicate may be, neither one can express a complete thought without the aid of the other.

In the sentence, *Bells ring,* the noun *bells* is the *complete subject* and the verb *ring* the *complete predicate.* In the second sentence quoted above, *bells* is the *simple subject,* and its modifiers are the article *the,* the adjective *great* and the prepositional phrase *in the tower; were cast* is the simple predicate, modified by the phrase *over a hundred years ago.*

Classification of Sentences. *As to meaning:* According to the form in which the thought is expressed—that is to say, according to whether it affirms or denies a fact, asks a question, or expresses command, entreaty or request—a sentence is said to be, respectively, *declarative, interrogative* or *imperative.* Thus, *Bells ring* is a declarative sentence—the commonest of all sentence forms. *Do you hear the bells?* is an interrogative sentence. *Listen to the bells* is an imperative sentence. In the interrogative form the predicate, either in whole or in part, generally precedes the subject.

Some grammarians include a fourth classification, called the *exclamatory* sentence, usually introduced by *how* or *what;* as *How sweet those bells sound from this distance!* This is really not a separate class, however, as any of the other three forms may be used in an exclamatory way. For example, *The bells are sounding the alarm!* illustrates the use of a declarative sentence as an exclamation. Similarly with interrogative and imperative sentences; as, *Will you listen to those bells! Hear those bells!*

As to structure: With respect to its grammatical structure, a sentence may be *simple, compound, complex* or *complex-compound.* The distinctions are as follows:

A simple sentence is one which, whether long or short, consists of but one subject and one predicate and makes a single assertion: *The bells* (subject) *are ringing* (predicate); *The bells of that old village church, cast more than a hundred years ago* (subject), *still have a most musical chime* (predicate).

A compound sentence consists of two or more simple sentences, each of which makes its own complete assertion. Usually these two or more clauses are joined by a coördinate conjunction such as *and, or, but: Bells are ringing* (first clause) AND *whistles are blowing* (second clause).

A complex sentence consists of one independent clause—that is, a clause that can "stand alone"—and one or more dependent or subordinate clauses: *The bells are announcing* (independent clause) *that the new prohibition law has been passed by Congress* (subordinate clause). A sentence may be both complex and compound; as, *The bells which you hear are hung in the tower and are over a hundred years old,* or *The bells are ringing and the whistles are blowing because the longed-for news has come at last.*

Order of Subject and Predicate. The usual arrangement is to place the subject and its modifiers first, and the predicate and its modifiers following. When the complete subject precedes the complete predicate, the sentence is said to be in the *natural order.* If there is any deviation from this arrangement, the sentence is said to be in the *inverted* or *transposed order.*

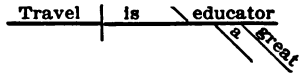
The transposed order is particularly common in poetry, where it is used for euphony and rhythm. When employed in ordinary prose, it is with the idea generally of adding emphasis and strength by bringing the important word or words into the position of importance—the beginning of the sentence. For example, when we say, *A marvelous organizer was Kitchener of Khartum,* we construct a far more impressive sentence than if we said, *Kitchener of Khartum was a marvelous organizer.* Other illustrations of the inverted arrangement are as follows: *For five long days the battle raged; Up sprang the Little Colonel; Into each life some rain must fall; Many a backward glance did we cast at the little town sleeping so quietly in the autumn sunshine; That he should have done so was only to be expected.*

Analyzing the Sentence. The *analysis* of a sentence consists in stating its classification and separating it into its component parts; that is, indicating the subject and its modifiers, if any, the predicate and its modifiers, and the function performed by each word, phrase and clause. See ANALYSIS for complete discussion and analysis of a type sentence.

In analysis the transposed sentence is changed over to the natural order and the interrogative sentence to the declarative form. For purposes of analysis, therefore, the inverted sentence, *A hale old man is he,* and the question, *Is he a hale old man?* both read, *He is a hale old man.* To analyze such a construction as *What do you want me to do?* we change it to, *You do want me to do what?* If the sentence is imperative, the implied subject *you* must generally be supplied in analysis; as, [*You*] *write your name on this dotted line.*

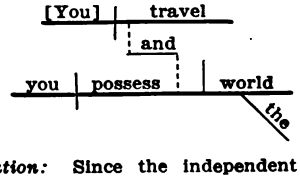
Diagram of a Sentence. The *diagram* of a sentence is merely a graphic representation of the analysis. It is a picture that shows, by straight lines, what work is done by each element and in what relations the different elements stand to one another. The following type sentences are diagrammed according to the Reed & Kellogg method, which has been widely adopted as being both simple to construct and easy to grasp. Diagramming is not so widely used as it once was.

SIMPLE SENTENCE: *Travel is a great educator.*



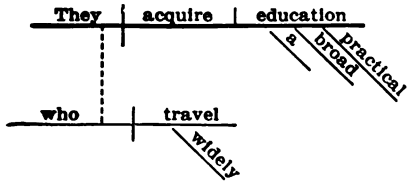
Explanation: The principal parts of the sentence—simple subject and simple predicate—are written on the heavy line, which is cut at right angles to mark the division between the two parts. On the lighter slanting lines are written the less important parts of the sentence—the modifiers. The short, oblique line separating *is* and *educator* indicates that the noun is the complement of the verb; if it cut the main line at right angles, it would indicate the object of the verb (see next diagram).

COMPOUND SENTENCE: *Travel, and you possess the world.*



Explanation: Since the independent clauses which make up any compound sentence are of equal rank, each one is indicated by a heavy line. The direct object *world* is separated from its verb by a short line drawn at right angles to the main line. Only transitive verbs, of course, can take an object in this manner.

COMPLEX SENTENCE: *They who travel widely acquire a broad, practical education.*



Explanation: The independent clause is shown on the heavy line, the subordinate clause on the lighter line. The dotted line indicates that *who* not only serves as the subject of the subordinate clause, but forms the connecting word between the two clauses.

Characteristics of a Good Sentence. There are five principal points of excellence which a sentence must possess to qualify as truly good English. First, it must be *grammatically and idiomatically correct*. Second, it must make its meaning absolutely *clear*. It must be *forceful and emphatic*. It must make *smooth, easy and euphonious* speech or reading, without annoying repetitions or grating sound combinations. And, finally, it must have *unity*, presenting one thought completely, instead of being a jumble of unrelated ideas loosely bound by conjunctions.

Common Errors. The principal errors that mar the sentences of our everyday speech have been discussed very fully in the articles on the parts of speech and other grammar topics. See list under GRAMMAR. L.M.B.

Consult Bloomfield's *Introduction to the Study of Language.*

Outline on the Sentence

I. Definition
II. Capitalization and punctuation
III. Parts of a sentence
  (a) Subject
  (b) Predicate
  (c) Modifiers
IV. Classification
  (a) As to meaning
    1. Declarative
    2. Interrogative
    3. Imperative
    4. Exclamatory forms of these classes
  (b) As to structure
    1. Simple
    2. Compound
    3. Complex
    4. Complex-compound
V. Order of subject and predicate
  (a) Natural order
  (b) Transposed or inverted order
VI. Sentence analysis
  (a) What it means
  (b) Type sentence analyzed (under ANALYSIS)
VII. Diagram of a sentence
  (a) Definition
  (b) Type sentences diagrammed
VIII. Characteristics of a good sentence
  (a) Grammatical correctness
  (b) Clearness
  (c) Emphasis
  (d) Ease and harmony
  (e) Unity

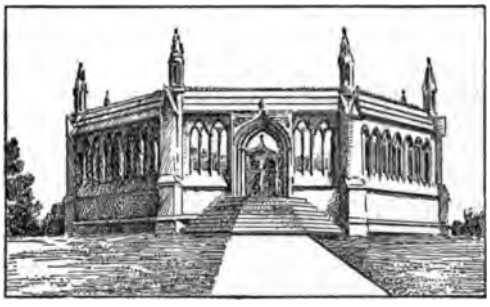
SEOUL, *seh ool'*, or *sah'ool*, the capital of the Japanese province of Chosen (Korea), is situated in the western part of the country, about nineteen miles to the northeast of Chemulpo, its port on the Yellow Sea, and about three miles north of the Han (or Kan) River. A wall eleven miles in circumference and pierced by eight gates surrounds this old city, which became the capital of the kingdom of Korea over six centuries ago. Seoul is typical of those Oriental municipalities into which modern innovations are slowly making their way. Electric lights, an electric car line which extends to three points outside the city, a telegraph station and a telephone system represent the new era, but the shabby, low dwelling houses and narrow, crooked streets of old Seoul are still in evidence.

A group of former royal palaces surrounded by attractive lawns and gardens, a Roman Catholic cathedral and a temple to Confucius are the buildings of chief interest The city is connected by railway with Chemulpo, Fusan and Wiju. It contains a government school for English students, two hospitals operated by American missionaries, and one large Japanese hospital under government control. Twenty-three Japanese and two Chosen newspapers are published here, besides an English daily owned by the government. Population in 1911, 223,-381. See CHOSEN.

SEPIA, *se'pi a*, a dark brown pigment prepared from the secretion found in the ink bags of certain species of cuttlefish (which see). As soon as a fish is captured its ink sac is removed, and the dark fluid is dried at once to prevent decay. The secretion, in the form of powder, is next treated with caustic alkali and acids, washed and dried. The resulting dark brown sepia is used to a limited extent in the preparation of water colors and drawing ink.

SEPOY REBELLION, *se'poi re bel'yun*, a mutiny of native troops in India, beginning in May, 1857, and followed in 1858 by the transfer of the government of India to the British sovereign. In its effects it may be regarded as the most important episode in the history of British India. The underlying cause was discontent

because of the introduction of Western ideas and the disregard of the English for native customs and religious beliefs. The climax came when the English ordered the Sepoys, as the native troops are called, to use greased cartridges. The Hindus had religious scruples about tasting anything prepared from the meat



MEMORIAL AT CAWNPORE
The marble building encloses a well where, on July 15, 1857, during the Sepoy Rebellion, many women and children were massacred.

of a cow, and consequently about biting the casings from the cartridges, but these ideas were held in contempt by the British officers.

On May 10, 1857, the native troops at Meerut, a town near Delhi, rose in frenzied revolt, freed from prison their countrymen who had refused to use rifles loaded with the obnoxious cartridges, and massacred the Europeans; they next seized Delhi. The revolt spread and was encouraged by Nana Sahib, who caused a massacre of men, women and children at Cawnpore. Lucknow, after a long siege, was finally relieved by Sir Colin Campbell. The revolt was practically crushed by June, 1858, though Oudh was not completely reduced until the beginning of 1859. A stately memorial has been erected to the Cawnpore victims.

Sepoy, from the Hindu word *sepahi,* meaning *a soldier,* is the term applied to a native soldier in the British army in India. The name was originally applied to any member of the Eastern armies, and the more familiar form was *spahee,* from *sip,* a bow and arrow, the weapons used by the ancient Hindu soldiers. The Sepoys in the British service now number about 140,000. They are a very valuable addition to the English forces, as they are courageous, temperate and indefatigable fighters.

Related Subjects. In connection with this discussion of the Sepoy Rebellion, the following articles in these volumes may be referred to:

Cawnpore	India, subhead *A Great Crisis*
East India Company	Lucknow
Havelock, Sir Henry	Outram, Sir James

SEPTEM'BER. A Canadian poet, Archibald Lampman, gives in his *September* a beautiful picture of the month in his northern homeland:

In far-off russet cornfields, where the dry
Grey shocks stand peaked and withering, half concealed
In the rough earth, the orange pumpkins lie,
Full-ribbed; and in the windless pasture-field
The sleek red horses o'er the sun-warmed ground
Stand pensively about in companies,
While all around them from the motionless trees
The long clean shadows sleep without a sound.

This month, the transition month between summer and autumn, partakes of the character of both seasons. In the southern part of the United States it is one of the warmest months, and even farther north hot days are not infrequent; but nights are likely to be cool, and there is often more than a touch of that golden haze which makes the later autumn days so beautiful.

It is a busy month in rural sections, for it is the harvest period for many crops, and while the "tilled earth . . . naked and yellow from the harvest lies," the "tanned farmers labour without slack," to store away the rich fruits of the fields. In the calendar of Charlemagne September was called the "harvest month," and it still bears that name in Switzerland. The Anglo-Saxons were more specific in their choice of a name, and called September the "barley month."

History of the Month. The old rhyme declares that—

SEPTEMBER CALENDAR

Birthdays

1. Peter Cartwright, 1785.
   James Gordon Bennett, 1795.
2. Henry George, 1839.
   Eugene Field, 1850.
3. Sarah Orne Jewett, 1849.
4. Pindar, 522 B. C.
   Phoebe Cary, 1824.
5. Cardinal Richelieu, 1585.
6. Marquis de Lafayette, 1757.
   Horatio Greenough, 1805.
   Sir Georges E. Cartier, 1814.
   Jane Addams, 1861.
7. Queen Elizabeth, 1533.
8. Richard I of England, 1157.
9. Thomas Hutchinson, 1711.
10. Mungo Park, 1771.
11. John Ireland, 1838.
12. Charles Dudley Warner, 1829.
14. Charles W. Gordon (Ralph Connor), 1860.
    Charles Dana Gibson, 1867.
15. James Fenimore Cooper, 1789.
16. Francis Parkman, 1823.
18. Samuel Johnson, 1709.
19. William B. Astor, 1792.
20. Alexander the Great, 356 B. C.
21. Louis Joliet, 1645.
    Clark Howell, 1863.
22. Earl of Chesterfield, 1694.
23. Caesar Augustus, 63 B. C.
24. John Marshal, 1755.
25. Felicia D. Hemans, 1793.
26. Samuel Adams, 1722.
29. Robert Clive, 1725.
    Admiral Nelson, 1758.
30. Pompey, 106 B. C.

Events

1. Aaron Burr acquitted, 1807.
   India passed from East India Company to the Crown, 1858.
   Canadian Land Act went into effect, 1908.
2. Battle of Actium, 31 B. C.
   Treasury Department of United States organized, 1789.
   Russians captured Lemberg, 1914.
3. New style calendar introduced in Great Britain and colonies, 1752.
   Treaty of Paris signed by United States and Great Britain, 1783.
4. Third Republic declared in France, 1870.
5. Exile of Acadians announced, 1755.
   First Continental Congress met in Carpenter's Hall, Philadelphia, 1774.
6. Pilgrims left Plymouth in the *Mayflower*, 1620.
   President McKinley shot by assassin, 1901.
   Peary's discovery of North Pole announced, 1909.
7. German retreat from the Marne, 1914.
8. New Amsterdam surrendered by the Dutch to the English, 1664.
   English gained possession of Montreal, 1760.
   Tornado at Galveston, Tex., 1900.
9. California admitted to the Union, 1850.
10. About 5,000 Acadians banished, 1755.
    Battle of Lake Erie, 1813.
12. President Kruger abandoned the Transvaal, 1900.
13. Battle on the Plains of Abraham; General Wolfe killed, 1759.
14. Battle of Aisne begun, 1914.
15. Russians burned Moscow, 1812.
    Siege of Paris begun, 1870.
17. Constitution of United States signed by Convention, 1787.
18. Quebec surrendered to the English, 1759.
    Rheims cathedral damaged by German fire, 1914.
19. President Garfield died, 1881.
20. Russians began siege of Przemysl, 1914.
21. Rioting in Ireland over Home Rule bill, 1912.
22. Nathan Hale put to death as a spy, 1776.
23. German airship raid over London, 1916.
25. Balboa discovered the Pacific Ocean, 1513.
26. Holy Alliance formed by Russia, Austria and Prussia, 1815.
27. General Howe entered Philadelphia, 1777.
28. Venizelos proclaimed provisional government in Greece, 1916.
29. William the Conqueror landed in England, 1066.
    Italy declared war on Turkey, 1911.
30. Greece, Serbia and Bulgaria mobilized, 1912.

For Study

Apple
Aster
Baltimore Oriole
Bulbs
Corn
Cotton
Equinox
Fog
Forests and Forestry
Goldenrod
Gourd
Hen
Mushroom
Potato
Roots
Seeds
Sunflower
Wheat

SEPTEMBER QUOTATIONS

1. O sweet September! thy first breezes bring
   The dry leaf's rustle and the squirrel's laughter,
   The cool, fresh air, whence health and vigor spring,
   And promise of exceeding joy hereafter. —*Arnold.*
2. That which is unjust can really profit no one; that which is just can really harm no one. —*Henry George.*
3. A cheerful temper joined with innocence will make beauty attractive, knowledge delightful, and wit good-natured. —*Addison.*
4. You may wear your virtues as a crown,
   As you walk through life serenely,
   And grace your simple rustic gown
   With a beauty more than queenly.
   —*Phoebe Cary.*
5. From dewy lanes at morning
   The grapes' sweet odors rise.
   At noon the roads all flutter
   With golden butterflies. —*Jackson.*
6. By all these lovely tokens
   September days are here,
   With summer's best of weather
   And autumn's best of cheer.
   —*Jackson.*
7. 'Tis education forms the common mind;
   Just as the twig is bent the tree's inclined. —*Pope.*
8. A merry heart goes all the day,
   Your sad tires in a mile-a.
   —*Shakespeare.*
9. To act the part of a true friend requires more conscientious feeling than to fill with credit and complacency any other station or capacity in social life.
   —*Ellis.*
10. Kind hearts are more than coronets,
    And simple faith than Norman blood.
    —*Tennyson.*
11. O sweet September rain!
    I hear it fall upon the garden beds,
    Freshening the blossoms which begin to wane. —*Collins.*
12. Finally, education alone can conduct us to that enjoyment which is, at once, best in quality and infinite in quantity.
    —*Mann.*
13. Be not the first by whom the new are tried;
    Nor yet the last to lay the old aside.
    —*Pope.*
14. A merry heart doeth good like a medicine. —*Proverbs.*
15. Life is to be fortified by many friendships. —*Sydney Smith.*
16. Yes! in the poor man's garden grow,
    Far more than herbs or flowers,
    Kind thoughts, contentment, peace of mind,
    And joy for weary hours. —*Howitt.*
17. The morrow was a bright September morn;
    The earth was beautiful as if newborn;
    There was that nameless splendor everywhere,
    That wild exhilaration in the air,
    Which makes the passers in the city street
    Congratulate each other as they meet.
    —*Longfellow.*
18. Example is always more efficacious than precept. —*Samuel Johnson.*
19. The true purpose of education is to develop, to their fullest extent, the capacities of every kind with which the God who made us has endowed us.
    —*Jameson.*
20. The noblest mind the best contentment has. —*Spenser.*
21. The only way to have a friend is to be one. —*Emerson.*
22. Through the long night the surges roared
    In hoarse, wild rage, against the rocks
    Whose flinty horns their white sides gored—
    Then came the Equinox. —*Blake.*
23. The pollen-dusted bees
    Search for the honey-lees
    That linger in the last flowers of September;
    While plaintive mourning doves
    Coo sadly to their loves
    Of the dead summer they so well remember. —*Arnold.*
24. True friendship is a plant of slow growth, and must undergo and withstand the shocks of adversity before it is entitled to the appellation.
    —*Washington.*
25. Ay, call it holy ground,
    The soil where first they trod:
    They have left unstained what there they found—
    Freedom to worship God.—*Hemans.*
26. Wondrous is the strength of cheerfulness, altogether past calculation its power of endurance. —*Carlyle.*
27. To the contented, even poverty is joy.
    To the discontented, even wealth is a vexation. —*From the Chinese.*
28. Now hath the summer reached her golden close,
    And lost, amid her cornfields, bright of soul,
    Scarcely perceives from her divine repose
    How near, how swift, the inevitable goal. —*Lampman.*
29. Education commences at the mother's knee, and every word spoken within the hearsay of little children tends towards the formation of character.
    —*Ballou.*
30. And soon, too soon, around the cumbered eves
    Shy frosts shall take the creepers by surprise,
    And through the wind-touched reddening woods shall rise
    October with the rain of ruined leaves.
    —*Lampman.*

Thirty days hath September,
April, June and November.

Many of the months have undergone changes in their number of days, but September has always had thirty days since old Roman times. It has not always been, however, as it is today, the ninth month. Before the calendar was revised by Julius Caesar it was the seventh month, and its name is from the Latin *septem*, meaning *seven;* for when the month was shifted in the Julian calendar to the ninth place in the year, its name was not changed.

The only holiday that falls in September is Labor Day, which in all the Canadian provinces and most of the states of the American Union is celebrated on the first Monday in the month. See LABOR DAY.

SEPTUAGINT, *sep'tu a jint,* the oldest Greek translation of the Old Testament. It is supposed that it was begun in the third century, B. C., in Alexandria, Egypt. It was completed before the Christian Era, and had an important influence in the preparation of the world for Christianity as well as in spreading it in the period of the early Church. Its oldest existing manuscripts, the Vatican and the Sinaitic copies, are still much used by scholars in the comparison of texts. The name, meaning *according to the seventy,* refers to an early belief that the translation was made in seventy-two days by seventy-two scholars brought by Ptolemy Philadelphus from Jerusalem. It is commonly indicated by the Roman numerals, *LXX.* See BIBLE.

SEQUOIA, *se kwoi'a,* a genus of cone-bearing trees famed for their gigantic size and their great age. Two species, both native to California, are found—the so-called *big tree,* or giant sequoia, and the *redwood,* or evergreen sequoia. Both species have been successfully introduced into European gardens by the planting of seedlings.

Big Trees. These giant trees are probably the oldest living things on the globe. Some of the patriarchs of the group must have been aged trees when the Pyramids of Egypt were being built, for, according to David Starr Jordan, the largest specimens may be seventy centuries old. A tree of average size, twenty-three feet in diameter, was felled, and its annual rings were counted; it was found to be about 2,125 years old. The descriptions of the largest specimens, most of which have been given special names, seem unbelievable to one who has never seen a big tree. "General Sherman" (see illustration on page 1059) has so huge a girth that it requires twenty men to encircle its trunk; the "Keystone State" is 325 feet in height; and the "Empire State" is ninety-four feet in circumference. The "Grizzly Giant," so-called because of its battered appearance, has several branches each of which is six feet in diameter. Through the hollowed trunks of some of the fallen trees two men may ride abreast on horseback, and another specimen, standing square across a roadway, has been cut through at the base and transformed into an archway through which a coach and four can easily pass. A dancing pavilion has been made by polishing the surface of the stump of one gigantic specimen, doubtless the only ballroom of its kind in the world. One traveler in the West tells of a tree having a great hollow burnt in it—probably the work of Indians—and in the space the six ponies and mules of the company were stabled. Yet so great was the vitality of this forest monarch that far above its foliage showed green and fresh against the sky.

The big trees, which are found only on the western slopes of the Sierra Nevada range, grow at altitudes of from 5,000 to 7,000 feet, and occur in scattered groves in the central part of California. One of the finest and best known groves, the Mariposa, is now a part of Yosemite National Park (which see). Other well-known groves are the Calaveras, Stanislaus, Fresno, Merced and Tuolomne. Over a million giant trees, having General Sherman as their chief, are contained in Sequoia National Park (see subhead under PARKS, NATIONAL).

THE SEQUOIA

The trunks grow straight and gradually taper, and the branches begin to appear about half or two-thirds of the distance to the top. The soft, coarse-grained wood is red in the center, but that containing the sap is white. So dur-

able is the wood that it resists decay for centuries, even when buried in leaf mold. Often an old tree is covered with rough, grooved bark two feet thick, but twelve inches may be considered an average figure. The bark is cinnamon-red on old trees, and reddish-purple on young specimens, and the featherlike leaves resemble those of the pine. The fruit is a small, oval cone containing seeds so small one can hardly believe that from them could grow such mighty trees. It is a picturesque Indian belief that the big trees alone among the children of the forest were specially created by the Great Spirit. All other trees, they say, grew like other plants. The genus was named in honor of Sequoyah, a half-caste Cherokee Indian who invented an alphabet for his tribe. In the words of John Muir—"The big tree is Nature's masterpiece. It has a strange air of other days about it, a thoroughbred look inherited from the long-ago. As far as man is concerned, it is the same yesterday, to-day and forever—emblem of permanence."

Redwood. Like the giant sequoias, the redwoods have tall, straight trunks bare of branches for a considerable distance from the base. They are also numbered among the forest giants, for the large trees are fifteen feet in

BUILT FROM ONE TREE
A church at Santa Rosa, California, built entirely from the wood of one great redwood tree.

diameter and 300 feet high, with occasional specimens 400 feet tall. These trees are found on the Pacific side of the Coast Range, in California and Southern Oregon, and are the most valuable timber trees west of the Rocky Mountains. The light, durable wood takes a beautiful satiny finish, and is used extensively for woodwork in houses. It is also valued for building lumber, paving blocks, railroad ties and poles. Fancy furniture and bric-a-brac are made from curly-grained redwood. The redwoods are being felled at a faster rate than the big trees because they grow lower on the slopes and are more accessible, and because many of the giant sequoia groves are in reservations or on private estates and are protected. The woodmen, too, feel that there is less danger from forest depletion, because the redwoods send up suckers from the stumps, and the big trees do not. These evergreen sequoias, though they are not on an average so large as their big brothers of the Sierras, are the more beautiful. B.M.W.

SERAGLIO, *se ral' yo,* from the Persian *serai,* meaning *old palace,* is the name given to the ancient residence of the Turkish sultan at Constantinople. It is beautifully situated on a point of land projecting into the sea. Its walls, which embrace a circuit of about nine miles, enclose a variety of mosques, the museum of Constantinople, the harem and large buildings capable of accommodating 20,000 people. As the palace has not been occupied by the sultan since 1839, it is falling into ruin. The word seraglio is now restricted to mean a harem or suite of women's apartments.

SERAJEVO, *ser' a ya vo,* the capital of Bosnia, also called Bosna-Serai. See BOSNIA, subhead *The Capital City.*

SERAPEUM, a name applied to any temple to the ancient deity Serapis (see below). Though the Serapeum at Alexandria was one of the most magnificent buildings in the world in its day, the structure usually referred to when the name is used without modification is the Serapeum of Memphis, in Egypt. This was of peculiar sanctity because in it was placed the sarcophagus of the sacred bull Apis (see APIS). In the vaults below the temple are still to be seen the rock-hewn tombs in which the Apis bulls were buried; and so carefully were the bodies embalmed, and so tightly were the mummies sealed up in their niches in the galleries, that many of them were found in an excellent state of preservation when the tombs were opened about the middle of the nineteenth century by archaeologists from England and from the German universities.

SERAPIS, *se ra' pis,* a name compounded of *Osiris* and *Apis,* and used in Egyptian mythology to denote a deity who was never recognized by the true Egyptians but was much worshiped in the Greek and Roman towns in Egypt. The great statue of Serapis, doubtless originally a statue of Jupiter, was kept at Memphis in a beautiful temple called the Serapeum, which was visited by pilgrims from all parts of Egypt because of its special holiness.

National Costume

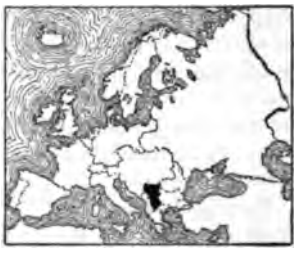
THE STORY OF SERBIA

SERBIA, *sur'bi a*, a country of Europe, situated in the northwestern corner of the Balkan Peninsula and inhabited by the Serbs, a people belonging to the Slav race. The name of *Servia* for the country and that of *Servians* for the people, which were used until recently by English and American writers, are not only incorrect, but they are objectionable to the Serbians, for they suggest the Latin word *servus*, which means *slave*.

Serbia gained its complete independence from Turkey by the Treaty of Berlin, which closed the Russo-Turkish War of 1877-1878. As a result of the two Balkan Wars of 1912 and 1913 the country almost doubled its area. When the War of the Nations broke out in 1914, Serbia had an area of 33,891 square miles, or about 2,400 square miles less than the area of Indiana. It contained 4,548,000 inhabitants, or about a quarter of a million less than the population of Ohio. This little country was one of the greatest sufferers from the great war, for it was overrun by the Germanic troops and held by them to the close of the conflict.

Serbia is bounded on the east by Bulgaria and Rumania; on the north by Austria-Hungary, from which it is separated by the Danube and Save rivers; on the west by Austria-Hungary, Montenegro and Albania; and on the south by Greece.

Its People. The Serbs are closely related to the Russians, the Poles, the Bohemians and the Montenegrins. They are found not only in Serbia, but also in the adjoining provinces of Austria-Hungary—particularly Croatia, Slavonia, Bosnia, Herzegovina, Banat and Dalmatia—where they form the great majority of the population. The Serbs and the Croatians speak the same language, but the majority of the Croatians are Roman Catholics, while the Serbs belong to the Greek Orthodox Church. During the last twenty-five years a strong movement for the creation of a Greater Serbia, which would include in one national state all the provinces inhabited by the Serb race, developed. As the realization of such an ideal could be brought about only at the expense of Austria-Hungary, it created a spirit of great enmity between Serbia and Austria-Hungary. The hatred against the latter country was intensified in 1908 when Austria-Hungary formally annexed the provinces of Bosnia and Herzegovina, which are inhabited by large numbers of Serbs.



LOCATION MAP

This little, almost insignificant kingdom of Southern Europe, through the crime of a fanatic, furnished the direct cause needed to fan smoldering war into a consuming flame.

The chief towns are Belgrade, the capital; Nish, Kragouyévatz, Pozarevatz, Leskovatz, Vranyé, Pirot, Novi Bazar, Prizren, Uskub and Monastir.

Physical Features. The country is high and mountainous, being traversed by spurs of the Carpathian Mountains in the northeast, the Balkan Mountains in the southeast and the Dinaric Alps in the west. The highest peak in the country, Liubotrn, reaches an altitude estimated to be 8,600 feet. Extensive plains and many deep and fertile valleys are found between the mountain ranges. The chief topographical feature of the whole region is the wide and extensive valley of the Morava River, which flows through the middle of the kingdom and empties into the Danube. Next in importance is the valley formed by the Vardar River, which flows south and empties into the Gulf of Saloniki, an arm of the Aegean Sea. Other important rivers are the Danube and the Save,

which form the northern boundary of the country, and the Drina and the Drin, which follow the western boundary. The climate is healthful, and is rigorous in the mountains but mild and equable in the lowlands.

Natural Resources. Serbia is a country of peasants, and agriculture is the chief occupation of the overwhelming majority of the inhabitants. The land is divided into a great number of small farms, for almost every peasant owns the land he tills. The chief crops, in normal times, are corn, which forms the staple food of the people, wheat and other grains. Large quantities of flax, hemp and tobacco are also raised. Fruit growing forms an important industry, some districts being specially suited for the cultivation of grapes, and others being given over to plum trees. Dried and preserved plums form an important item of export from the country. Forests cover about one-third of the total surface of Serbia and constitute an important source of wealth. The raising of live stock, especially hogs, is one of the important occupations of the people. The country is rich in mineral wealth, the chief minerals found being coal, copper, iron and zinc. Lack of capital and transportation facilities have hindered the developing on an extensive scale of the mining industry.

There are nearly 1,000 miles of railroads. The trunk lines traverse the country from north to south through the two valleys of the Morava and the Vardar. One of the chief railroad lines runs from Belgrade to Nish and from there to Sofia (which see), the capital of Bulgaria. This line is a part of the transcontinental railroad line which unites Berlin and Vienna with Constantinople. At Nish the trunk line which runs south to Saloniki connects with the northern lines.

Government. Serbia is a constitutional monarchy and is governed under a constitution adopted in 1889. The legislative power is vested in an assembly, called the *Skupshtina,* the members of which are elected by the people for a period of four years. The executive power is vested in the king and a Cabinet of eight ministers, who are responsible for their acts to the Skupshtina. There was no Serbian government between 1915 and the end of the War of the Nations.

History. In ancient times Serbia formed a part of the Roman province of Moesia. At the time of the invasion of the barbarians it was occupied in succession by Huns, Ostrogoths, Lombards and Avars. At the invitation of the Byzantine emperors of Constantinople, the Serbs settled in this region during the seventh century. In the eleventh century the Serbs threw off their allegiance to the Byzantine emperors and established an independent kingdom. This Serb kingdom extended its territory and in the middle of the fourteenth century it occupied a great part of the Balkan Peninsula and included, besides the present kingdom of Serbia, Montenegro, Bosnia, Albania, part of Bulgaria, and the northern part of Greece.

The Turks then invaded the country, and the Battle of Kossovo (1389), which was a defeat for the Serbs, decided the fate of Serbia. By the end of the century the Turks were masters of the country, as well as of the remainder of the Balkan Peninsula. Serbia remained a part

COMPARATIVE AREAS
Serbia is not quite as large as the state of Indiana.

of the Ottoman Empire for over four hundred years. At the beginning of the nineteenth century the Serbs revolted and compelled the Turks to grant the country an autonomous government headed by national princes. In 1876 Serbia, in order to help the revolt of the Serbs in Bosnia, declared war against Turkey. The Treaty of Berlin (1878) recognized the complete independence of the country, and in 1882 the principality was proclaimed a kingdom.

Recent Events. Serbia, together with Bulgaria, Greece and Montenegro, formed the Balkan Alliance which defeated Turkey in the first Balkan War and conquered the vast territory which formed the greater part of the Turkish Empire in Europe. The quarrel between the allies over the division of this territory led to the second Balkan War, in which Bulgaria was defeated. Serbia obtained in consequence a

great strip of Macedonia which was coveted by Bulgaria. The gains of Serbia excited the jealousy of Austria-Hungary, while the attitude of the latter country during the Balkan Wars increased the hatred of the Serbs towards it. The assassination at Serajevo of Archduke Francis Ferdinand, the heir to the throne of Austria-Hungary, on June 28, 1914, by Serb fanatics who expected to further by such means the realization of their ideal of a Greater Serbia, was followed a week later by an ultimatum sent by Austria-Hungary to Serbia, so humiliating that Serbia was loath to accept it, and was given but a few hours to decide. This led to the declaration of war by Austria-Hungary, and to the larger conflict known as the War of the Nations. Austria-Hungary immediately attacked Serbia, but without much success. The great campaign against that country began in the fall of 1915, when Bulgaria joined the Central Powers. Belgrade was occupied by the Austrians on October 9, 1915, and as a result of a powerful drive by overwhelming forces of Austrians, Germans and Bulgarians the whole of Serbia was in the hands of the enemy by the end of 1915. The king, Peter I, took refuge in Saloniki, in Greece, and the Cabinet repaired to Corfu. See WAR OF THE NATIONS.

Other Items of Interest. In Serbian the name of the country is spelled *Srbija*, but since *r* partakes of the nature of a vowel, the first syllable is not unpronounceable.

Linbotrn, Serbia's highest peak, is hundreds of feet above any other height of land in the Balkan Peninsula.

The language of Serbia, which is called Serbo-Croatian, is one of the most expressive tongues in all Europe, and the literature which has grown up in it is notable. Serbian writers have excelled particularly in the production of short stories which abound in "local color."

The country has many mineral springs rich in iodine and in sulphur, and attempts have been made to establish popular health resorts, but for the most part without success.

One of the important industries of Serbia is the making from plums of a mild alcoholic liquor known as *raki*.

In proportion to its population, Serbia has more hogs and sheep than any other country of Europe.

Military service is compulsory, and training begins at the age of eighteen, while a man is on the reserve list until he is fifty. For field service, a man is liable between the ages of twenty-one and forty-five.

Outline and Questions on Serbia

I. Location

(1) In Balkan Peninsula
(2) Boundaries

II. Size

(1) Area
  (a) Before Balkan Wars
  (b) After Balkan Wars
(2) Compared with other countries or states

III. Geography

(1) Mountainous character
  (a) Highest peak in Balkan Peninsula
(2) Plains and fertile valleys
(3) Rivers
(4) Climate
  (a) In mountains
  (b) On lowlands

IV. Resources and Industries

(1) Agriculture
  (a) Peasant ownership of land
  (b) Crops
  (c) Stock raising
(2) Forests
(3) Mineral wealth
  (a) Undeveloped condition
(4) Transportation

V. The People

(1) Race and relationships
(2) Language
(3) Religion
(4) Government
(5) Desire for a Greater Serbia

VI. History

(1) In ancient and medieval times
(2) Home rule secured from Turks
(3) Independence
(4) The Balkan Wars
(5) The War of the Nations

Questions

Why are bureaus of charity unnecessary in Serbia?

Why do the Serbians object so seriously to having their name spelled with a *v* instead of with a *b*?

Why could not a Serbian musician play if he broke a string of his fiddle?

How many countries of the Balkan Peninsula are larger than Serbia?

What is meant by the ideal of a Greater Serbia, and why has it thus far been impossible of achievement?

What part did this little country play in bringing about the greatest war the world has ever seen?

How does the loftiest point in the country rank as to height with the other peaks of the Balkan Peninsula?

Of what forms of animal life does Serbia have more, relative to its population, than any other European country?

What is the *Skupshtina*?

When did the Serbs come into this region, and at whose invitation?

What was the fate of the country during the second year of the War of the Nations?

To what unusual use are plums put in Serbia?

Serbia contains no workhouses, and it is almost impossible to find a pauper from one end of the country to the other.

The national instrument of the country is a fiddle with a single string, known as the *gusle*.

A Serbian mother usually carries her baby slung over her shoulder in a canvas bag. O.B.

Consult Woods' *The Danger Zone of Europe;* Stead's *Serbia and the Serbians;* Crawford's *The Balkan Cockpit* (published in the second year of the War of the Nations).

Related Subjects. The reader who is interested in Serbia is referred to the following articles in these volumes:

GEOGRAPHY

Balkan Peninsula — Carpathian Mountains
Belgrade — Danube

HISTORY

Balkan Wars — Russo-Turkish Wars
Berlin, Congress of — War of the Nations
Peter I, Karageorgevitch

SERFS, laborers under the feudal system in Europe, who were bound by law to the land on which they lived, being transferred with it from one owner to another. The serf system of labor arose in the disorderly period of the early Middle ages, when, in return for protection from raiders, the peasants cultivated the land of the lords and paid them dues on houses, cattle, etc., as they demanded. Serfs were a higher order than slaves and lower than villeins, who were free to go from one lord to another if they chose. Most of the slaves eventually rose to serfdom, and many serfs were able to obtain the freedom of the villein. Both serfs and villeins, however, suffered deep misery from their degraded position, excessive taxation and deprivation of educational and religious advantages. By the nobility and clergy, they were considered as less than the cattle or the game on their estates. The system disappeared gradually, with other institutions of feudalism, in the later Middle Ages, but its spirit survived far into the modern period, till the people themselves arose, from time to time, and wrested their rights from those who oppressed them.

Serfdom in Russia was the result, not of feudalism, but of the despotism of the government. It was abolished in 1861, when 45,000,000 serfs of the Crown were freed by decree of Alexander II. See FEUDAL SYSTEM.

SERGEANT, *sahr'jent,* a noncommissioned officer found in every army, next in rank above a corporal. His is the highest noncommissioned rank, the grade above being that of second lieutenant, a commissioned officer. He is usually chosen because of superior intelligence and good conduct from among the corporals of his company (see CORPORAL). His duties are to preserve discipline, to teach drills and to command small detachments, such as an escort body. In the United States service, every company of coast artillery and every company of engineers has eight sergeants; every troop of cavalry and every battery of field artillery has six; and every company of infantry has four, besides the first sergeant and the quartermaster-sergeant.

SERGEANT-AT-ARMS, an officer appointed by legislative bodies to enforce order at their meetings, to serve processes ordered by the assembly and to make arrests of members during the session when their presence is necessary to constitute a quorum. The sergeant-at-arms in each branch of the Congress of the United States is an important officer, and his authority cannot be ignored. When the sergeant-at-arms carries the mace (which see) down the aisle of either house all disorder should cease. Anyone continuing in disorder after this demonstration is guilty of contempt. The sergeant-at-arms of the House of Representatives also has charge of the pay roll of the members.

In the Canadian Parliament the sergeant-at-arms of the House of Commons has charge of messengers and pages, looks after the furniture of the house and offices, arrests offenders against the privileges of the house, and carries the mace before the speaker on official occasions during sessions of Parliament.

In Great Britain, such officers are appointed to attend the Speaker in the House of Commons and the Lord Chancellor in the House of Lords. The duties of sergeant-at-arms are also exercised by any of the eight members of the royal household who have charge of the ceremonies at public functions.

The office is said to have been created in the latter half of the twelfth century by Richard I of England, who appointed a corps of twenty-four members to attend him and guard his person.

SERINAGUR, *se re'nuh gur,* or **SRINAGAR,** the capital city of Kashmir in India, near the lake made famous by Moore in his *Lalla Rookh.* Serinagur is situated on the Jhelam River, 170 miles northeast of Lahore, in the lovely Vale of Kashmir. There are picturesque mountains in the background, and near by are beautiful gardens. The buildings of the city present a curious combination of different forms of architecture. Serinagur is a center for rug-weaving and the manufacture of silver articles,

attar of roses, paper and leather. Population, about 127,000.

SEROUS MEMBRANES, *se'rus mem' brayns.* See MEMBRANES, subhead *Serous Membranes.*

SER'PENT. See SNAKE.

SERPENT CHARMING, an ancient art in Egypt and the East, the practice of which is usually passed from father to son. It is mentioned in the Old Testament and by many classical writers. Occasionally the serpent charmers cut out the poison fangs of their snakes, to render them harmless, but the custom is not so general as is supposed. The secret of snake charming without danger seems to be the possession of confidence and knowledge of the reptiles' habits. Snakes are fond of music, and the usual way of controlling them is by playing a flutelike pipe. The serpent, resting on the coils of its lower body, will sway the upper part from side to side. Asps have no external ears, so music cannot influence them; regular, rhythmical motion will, however, and the serpent charmer waves his pipe back and forth as he plays. Even professional charmers will play tricks only with the safer, hooded varieties.

SER'PENTINE, a variety of rock composed of silica, magnesia and water. It ranges in color through various shades of green to brown, yellow and red. Most varieties are green, spotted or streaked with streaks of white. Serpentine is strong, easily quarried, takes a beautiful polish and is a valuable building stone. Varieties containing iron, however, should not be used for exteriors, since they discolor when exposed to the weather. In some localities in the United States green serpentine is known as *verde antique* marble, though it is not marble. The name serpentine was given this rock because of its green and mottled appearance, which resembles in a slight degree the skins of serpents. Asbestos (which see) is a fibrous variety of serpentine.

SERUM THERAPY, *se'rum ther'a pi,* a modern method of treating disease that has made great progress in recent years. Its purpose may be either preventive or curative, but the underlying principle is that the injection of a prepared serum will create in the body of the subject the needed resisting power. By *serum* is meant a fluid compound which will kill the disease germs already present in the blood or render the subject immune to an invasion of a particular disease. Perhaps the most successful serum thus far discovered is the antitoxin used in treating diphtheria. *Therapy* means *therapeutics,* or that part of medical science which treats of the discovery and application of remedies for disease.

Experiments are continually being made to discover serums that will have positive curative effects in cases of tuberculosis, pneumonia, typhoid and other infectious diseases. The usual method of preparing a serum is as follows: Cultures of the particular disease germ are made and injected into the body of a healthy cow or horse. The serum produced in the blood of the animal to fight the poison is then tested by experimentation with some other animal and if found adequate is used on human beings.

The employment of vaccination to prevent smallpox or typhoid fever is an example of vaccine therapy.

Related Subjects. The reader is referred to the following articles in these volumes:

Antitoxin	Medicine and Drugs
Diphtheria, subhead *Treatment*	Vaccination

SERVAL, *sur'val,* a large, wild cat of Africa, the tawny, black-spotted fur of which appears in the market under the trade name of *tiger cat.* The animal is about three feet long, and has a sixteen-inch tail and rather large ears.

THE SERVAL

As the African native chiefs wear mantles made of serval fur, these wild cats are being threatened with extermination. They are easily tamed if captured when young, but are difficult to raise. It is said that a serval always shows signs of temper when it sees a black man. In South Central Africa, where these cats are fairly common, they hide in thick bushes along river banks, waiting for their prey, which consists of small antelopes, rabbits, fowl and other creatures.

SERVETUS, *sur ve'tus,* MICHAEL (1511-1553), a Spanish physician, scholar and theologian, who gained the enmity of Roman Catholics and Protestants during the Reformation and was finally burned at the stake as a heretic.

He was born at Ludela, in Navarre; at the age of seventeen he was sent to Toulouse, France, to study law, but soon transferred his interest to religious questions. For ten years he had a varied existence, first in the train of a Franciscan monk who was confessor to Emperor Charles V, then in the company of various Protestant teachers in Geneva and Basel, later as an editor of scientific works for a firm of publishers in Lyons, and finally as a medical student at the University of Paris. He became skilled in surgery, and delivered lectures on medicine and other subjects.

The various books which Servetus wrote were destroyed as fast as found by Catholic and Calvinist alike; so successful was the hunt that only two perfect copies are known of his last book, *Restitutio Christianismi.* In this volume is a description of the pulmonary circulation, for which Servetus is sometimes credited with the discovery of the circulation of the blood, but the rarity of this book even in its own day explains why Harvey is regarded as the true discoverer.

SERVIA, *sur'vi a.* See SERBIA.

SERVICE, *sur'vis,* ROBERT WILLIAM (1876-), a Canadian poet and novelist who won fame for his stirring ballads about life in the Yukon. He has been called the Canadian Kipling, but he must also be given credit for the originality of his material. In some respects he occupies a position more nearly like that of Bret Harte in American literature, for the poems and stories of both men deal with frontier days, with the rough life of the miner, the hunter and the trapper. Service's poems have a characteristic swing which suggests the freedom of the Yukon as he saw it. His first book of verses, *The Spell of the Yukon,* won for him an international reputation, which has been strengthened by his later work, *Songs of a Sourdough, Ballads of a Cheechako* and *Rhymes of a Rolling Stone.* He has also written two novels, *The Trail of '98* and *The Pretender.*

Service was born at Preston, England, and was educated at Glasgow, Scotland, where he became a bank clerk. He came to Canada in 1897, and for several years engaged in farming on Vancouver Island, at the same time making extensive trips along the Pacific coast and through the Yukon. In 1905 he entered the employ of the Canadian Bank of Commerce, which sent him first to White Horse and later to Dawson. After a short time he resigned his position to devote all his time to writing.

SER'VIUS TUL'LIUS, the sixth of the seven legendary kings of early Rome. He is credited with having been the author of a reform in the government by which all landowners, and not merely the patricians, as formerly, became subject to taxation and were obliged to do military service. This was the first time the plebeian class were recognized as being of any value to the Roman state, and the reform opened the way for a later struggle for the rights of citizenship. Servius is also said to have added two hills to the five already occupied by Rome, and to have enclosed the whole city with a rampart, wall and moat. See ROME.

SETI I, *sa'te,* a famous king of ancient Egypt, who reigned about 1350 B.C. He invaded Syria and met with some successes, but encountered the Hittites, who compelled him to turn back. His chief claim to fame lies in the magnificent structures which he erected, or began, on many of which are sculptured accounts or representations of his conquests. Among the most important of these is the Hall of Columns at Karnak (see THEBES). The great tomb, with its numerous chambers, which he built, was discovered by Belzoni in 1817, and his mummy, with that of his famous son, Rameses II, was found at Deir-el-Bahri in 1881.

SETI I

The head of the mummy of the king and builder who lived at least thirty-two centuries ago.

SE'TON, ERNEST THOMPSON (1860-), a popular writer on nature subjects, identified with the organization of the Boy Scouts of America and the Woodcraft Indians. He was born at South Shields, England, but was taken to Canada in early boyhood, and between the ages of six and ten lived in the Canadian backwoods. Later he lived on the Western plains. Seton was educated at the Toronto Collegiate Institute and at the Royal Academy of London, and he also studied art in Paris between 1890 and 1896. Believing that the average boy needs something to do and something to think about in connection with outdoor life to become a good citizen, he organized, in 1901, the Woodcraft Indians. This society was merged

in 1910 with the Sons of Daniel Boone to form the Boy Scouts (which see). Seton became chief scout of the new organization, and continued in this office until 1915.

The animal stories of Seton, which he himself has largely illustrated, are among the most interesting of their kind. They include *Wild Animals I Have Known, The Biography of a Grizzly, Lives of the Hunted, Animal Heroes* and *Wild Animals at Home.* He has also written for the Scout boys a handbook of the Boy Scouts of America, and for the Woodcrafters *Woodcraft and Indian Lore* and *Manual of the Woodcraft Indians.* Seton is widely known as a lecturer, and he was one of the principal illustrators of *The Century Dictionary.* His real name is Ernest Seton Thompson, but Thompson Seton has been adopted for literary purposes.

SETTER, *set'er,* a hunting spaniel, so called because it was originally taught to crouch low in marking game birds. This was in the days when birds were caught in nets, and the dogs had to creep close to the ground to keep their

ENGLISH SETTER

heads out of the meshes when the net was thrown from behind them. After guns came into use in hunting, setters were taught to raise the forefoot in much the same way as pointers do in indicating the game. The standard English setter (see illustration), one of the best breeds, is white, with well-marked black spots. The Irish setter is red, without any trace of black, but it is sometimes marked with white. A well-known Scottish breed is the Gordon setter, which has a rich, glossy black coat, with dark reddish-tan spots about the head and on the limbs. Of the three breeds the Gordon is the heaviest. Setters are handsome, intelligent dogs, and are very obedient and good tempered. See POINTER; SPANIEL.

SEVEN SLEEP'ERS, heroes of a legend dating from the sixth century. While the city of Ephesus was being persecuted by Decius (A. D. 251) seven Christian brothers escaped to a cave in Mount Celion. The heathen, discovering them there, walled up the entrance with rocks. The brothers fell into a marvelous sleep which lasted till 447, when they were awakened by a shepherd seeking shelter for his sheep. One of their number went down to the city to buy food, but as he offered coin two centuries old he was seized as a thief of hidden treasure and arrested. At his trial the truth was revealed, he was accompanied by the Emperor Theodosius II to the cave, and there with his brothers he convinced his hearers that the miracle was intended by God to confirm and strengthen Christian faith. In the *Koran* the same legend is told, and there the sleepers are accompanied by a dog who refuses to be driven away, saying: "I love those who love God. Sleep, masters, and I will keep guard."

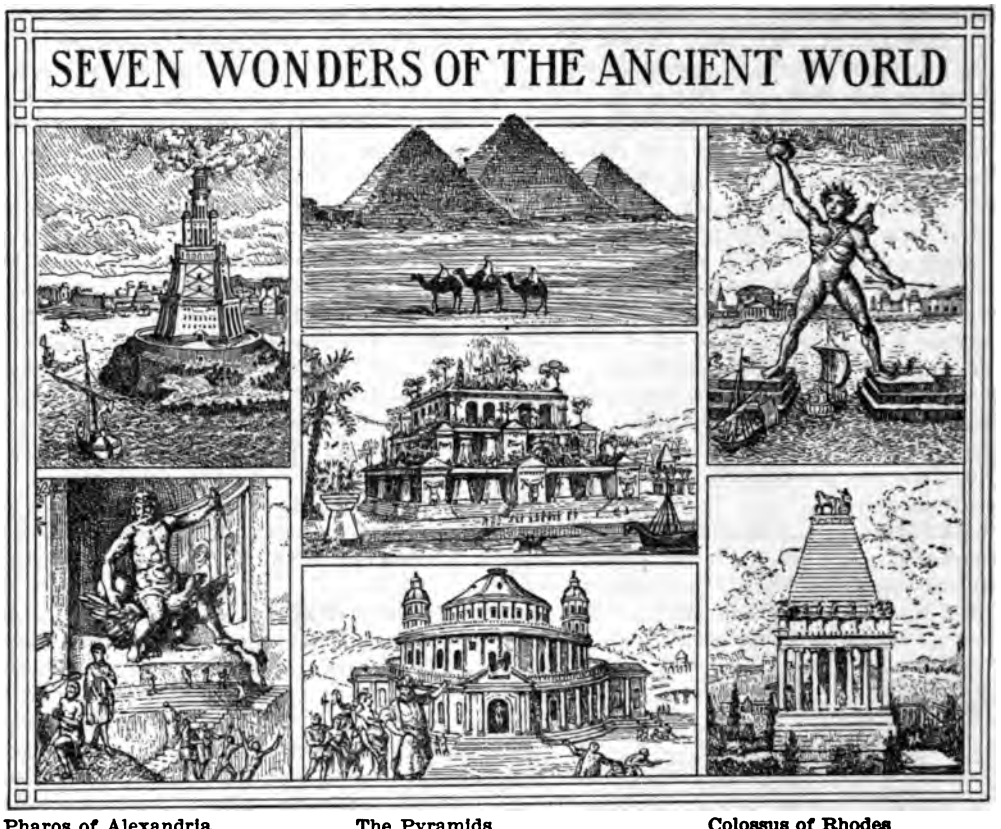
SEVENTEEN-YEAR LOCUST. See CICADA.

SEVENTH-DAY AD'VENTISTS, a branch of the sect of Adventists, dating from 1845, who believe that the observance of the seventh day (Saturday) as the Sabbath is obligatory upon Christians. In 1850 headquarters were established at Battle Creek, Mich., where they remained until their removal to Washington, D. C., in 1903. Seventh-day Adventists hold that Christ will some day appear again in person, that the dead will sleep until his second coming, that the righteous dead will then be raised to life, and that the living righteous will be made immortal. They put great stress on health and abstinence from intoxicating liquors or self-indulgence of any kind, and were the founders of the Battle Creek Sanitarium, with which, however, they have no longer any official connection. There are nearly 2,000 churches of this denomination in the United States and Canada, having a membership of about 75,000. See ADVENTISTS.

Owing to their religious principles these people are not permitted to take active part in war. When the United States entered the War of the Nations in 1917 President Wilson was notified of their position. They agreed that their Church should not shield "slackers," and therefore refused to admit new members during the continuance of the war.

Consult Tait's *Heralds of the Morning;* Loughborough's *The Great Second Advent Movement.*

SEVEN WEEKS' WAR, the name given to the struggle which took place in 1866 between Prussia and Austria. The rivalry between the



Pharos of Alexandria
The Olympian Zeus
The Pyramids
Hanging Gardens of Babylon
Temple of Diana
Colossus of Rhodes
Mausoleum at Halicarnassus

two countries had existed for years, and Bismarck had purposely pushed it to the verge of war that it might be decided for all time which of the two states was to be supreme in Germany. The final break occurred over the Schleswig-Holstein question. Prussia had on its side Italy, which hoped to be able to free Venetia from Austria, and the most of the North German states, while Austria's allies were Bavaria, Württemberg, Saxony, Hesse, Hanover and various small states. Following the plans laid out by Von Moltke, the Prussians won victory after victory, and after the battle of Koniggrätz, or Sadowa, it became apparent that there was nothing for the Austrians to do but to make peace. The Peace of Prague, by which matters were formally settled, added greatly to the prestige of Prussia in Germany.

Related Subjects. The reader will find additional information in the following articles in these volumes:

Austria, subhead *History*
Bismarck-Schönhausen
Moltke, Count von
Prussia, subtitle *Government and History*
Sadowa, Battle of
Schleswig-Holstein

SEVEN WISE MEN OF GREECE, the name commonly applied to seven sages who lived in Greece in the last quarter of the seventh and the first half of the sixth century B. C. Authorities differ somewhat as to the seven names, but the list generally accepted is Bias, Chilon, Cleobulus, Periander, Pittacus, Solon and Thales. Their wisdom was recognized during their lives, and they gained honor and influence as public men in their own cities. Brief poems and short, pithy sentences became current which were supposed to embody their wisdom, such as "Know thyself" and "Nothing in excess."

SEVEN WONDERS OF THE WORLD, the seven works of art most noted among the ancients for beauty or for remarkable size. The earliest list of these was compiled from the numerous guide books of the Greeks and differs only slightly from the second and more authentic list found in the work of Philo of Byzantium. This includes the Pyramids of Egypt, the Hanging Gardens of Semiramis at Babylon, the statue of Jupiter, or Zeus, at Olympia, by the sculptor Phidias, the temple of Diana at

Ephesus, the Mausoleum at Halicarnassus, the Colossus of Rhodes and the Pharos, or lighthouse at Alexandria.

Seven Modern Wonders. The present age is one of supremacy in science rather than in art, and the wonders of the modern world are its great inventions and discoveries. Leading scientists have agreed that the seven most marvelous scientific discoveries are the wireless telegraph, telephone, flying machine, radium, antiseptics and antitoxins, the X-ray and spectrum analysis. These are called the "Seven Modern Wonders."

The wireless telegraph, invented by Guglielmo Marconi, an Italian, is the only means of communication with ships at sea, and all modern steamships and warships are equipped with wireless outfits. No means of communication has proved of more general convenience than the telephone, invented by Reis of Germany and Gray and Bell of the United States. The aeroplane, invented by the Wright brothers of Ohio, demonstrated its value during the War of the Nations, and all modern military departments have these air crafts in their service. There has been no innovation of greater benefit to mankind or of more importance in surgery than the discovery of antiseptics by Sir Joseph Lister. Antitoxins, radium and the X-ray are all aids to the physician and surgeon in treating human ills. Radium was discovered by Pierre and Marie Curie, and the X-ray was the discovery of Roentgen. Spectrum analysis, of importance in the analysis of the light of stars, chemicals and metals, was discovered by Sir Isaac Newton. E.B.P.

Related Subjects. The reader is referred for more detailed information to the following articles in these volumes:

Antiseptic, subhead *In Medicine*	Mausoleum
Antitoxin	Pharos
Colossus	Pyramids
Diana, subhead *Temple of Diana*	Radium
Flying Machine	Roentgen Rays
Hanging Gardens of Babylon	Spectrum Analysis
	Telegraph, subtitle *Wireless Telegraph*
	Telephone

SEVEN YEARS' WAR, a struggle between Prussia and other European powers which broke out in 1753. Frederick II of Prussia had seized some years before the province of Silesia and had made good his hold on it in the Silesian wars. Although the Treaty of Aix-la-Chapelle confirmed him in his possession of it, Maria Theresa had never given up the hope of regaining it and had done her utmost to form strong alliances against Frederick. Russia joined her readily and looked forward to receiving a part of the conquered Prussian territory at the close of the war. To bring about an alliance with France, the hereditary enemy of Austria, was a difficult matter, but Maria Theresa, under the guidance of her minister Kaunitz, wrote a letter to Madame de Pompadour, the mistress of the French king, and solicited an alliance; and the conclusion of an agreement between Prussia and Great Britain, with whom France was at that time at war in the United States, decided the French to aid Austria.

Frederick the Great, acquainted with all the moves of his enemies, determined to strike first, and in August, 1756, entered Saxony, whose elector he knew sympathized with Austria. He defeated an Austrian army sent to the aid of Saxony, compelled the Saxon army to surrender and made himself master of the entire country. By the beginning of 1757, however, matters looked black for Prussia. Sweden had joined the allies, and thus practically the whole of Europe was united against Frederick, who had as his only ally England, from whom at that time he was receiving little help. A subsidy was paid him by England, but the army of English and Hanoverians which had been sent to his aid was small and badly officered. Frederick marched into Bohemia, won a battle before Prague and began a siege of the town, but was defeated at Kolin in June and driven back into Saxony. The English commander was shortly afterward defeated by the French and forced to make a virtual surrender, which, however, the British government refused to acknowledge. Later in the same year, Frederick won a victory over the French at Rossbach and one over the Austrians at Leuthen and made himself master again of almost the whole province of Silesia, which had been retaken by Austria.

When the campaign of 1758 opened, Frederick's position was somewhat more favorable. He had gained favor and prestige through his conduct of the earlier stages of the war, and on the accession of William Pitt to power in England a policy of more active aid to Prussia was adopted. A new army was organized under Ferdinand of Brunswick, who during the remainder of the war won several victories and was of great help to Frederick. The contest began in 1758 by a defeat of the Russians, and though Frederick was himself shortly afterward beaten he managed to retain possession of both

Silesia and Saxony. A severe defeat at Kunersdorf in 1759 reduced Prussia well-nigh to a state of exhaustion, but the victories of the English over the French in that same year bettered matters somewhat. Frederick won two brilliant victories in 1760, but the death of George II of England and Pitt's fall from power took from Prussia its only ally and made its ruin seem inevitable.

In 1762, at the most critical time, Elizabeth of Russia died and was succeeded by Peter III, an enthusiastic admirer of Frederick. Prussia made a treaty with Russia, and Frederick won several minor victories, but Peter was deposed and plans for an active alliance between Russia and Prussia were at an end. Russia did not, however, again join Austria, and as both sides were practically exhausted, peace was concluded at Hubertsburg early in 1763. Frederick was allowed to keep possession of Silesia, and matters were adjusted as they had been before the war.

Influence in America. By no means the least important part of this conflict was the struggle between France and England which ended by wresting from France its colonial possessions in America and making England supreme in India. In United States history this struggle is known as the French and Indian War. A.MC C.

Consult Carlisle's *Life of Frederick the Great;* Longman's *Frederick the Great and the Seven Years' War.*

Related Subjects. Further information about the Seven Years' War in its various phases may be gained from the following articles in these volumes:

Clive, Robert	Montcalm de Saint-Veran, Marquis de
Frederick II (Prussia)	Pitt, William
French and Indian Wars	Pompadour, Marquise de
Kaunitz, Prince	Silesia
Maria Theresa	Wolfe, James

SEV'ERN, one of the principal rivers of England, formed by the union of two small streams which rise in Mount Plinlimmon, in Wales. It flows in a circuitous route through England and discharges into the Bristol Channel through an estuary several miles wide, under which runs a tunnel about four miles long. Its total length is 210 miles, and it is navigable as far as Welshpool, a distance of 180 miles. Great tidal waves have frequently caused serious inundations on its banks. The principal cities on the Severn are Gloucester, Worcester and Shrewsbury.

SEVERUS, *se ve'rus,* LUCIUS SEPTIMIUS (146-211), a Roman emperor, of whose family and early life little is known. He was in Gaul when the Emperor Pertinax was assassinated in March, A. D. 193, and at once set out for Rome with his troops, who had declared him emperor.

Julianus meanwhile had purchased the imperial dignity from the praetorian guards at Rome, but his own soldiers turned upon him and put him to death on the approach of Severus, who at once became emperor.

He punished the murderers of Pertinax, and then went to the East to put down a rival to the throne, Pescennius Niger, whom he defeated in 194. On his way back he took Byzantium, after a siege which lasted over two years, and there in A. D. 197 he overthrew Albinius, another rival. After a successful campaign against the Parthians he went to Britain, where he penetrated to the extreme north of the island, losing many of his men; and to guard the people of the south from the invasions of the Highlanders he built a wall across the island from the Tyne to the Solway Firth (see ROMAN WALLS).

SEVILLE, *se vil',* an important city of Spain, famed in poetry and song. It is situated on the Guadalquivir River, about sixty-two miles northeast of Cadiz, in the midst of a country of sunny vineyards, orange and olive groves, and is variously called "The White City on the Guadalquivir" and "Queen of Andalusia." It has an added fame in being the birthplace of Spain's two greatest masters of painting—Velasquez and Murillo.

For many centuries Seville was the home of the Moors, and its architecture now presents a curious mingling of Moorish and Christian forms. In recent years it has lost much of its picturesque Moorish atmosphere, apparent in the network of small, shaded streets, the quaint, balconied houses built around handsome courtyards and gardens, and the fine squares studded with fountains, for Seville is being enlarged and beautified in a modern sense. Its narrower quarters are being cleared away to make room for modern homes and shops. However, there are still to be found many of the old foot streets, where no carriages go, and which are lined with bazarlike shops overhung with "sails" drawn from roof to roof. There one brushes shoulders with the picturesque cigarette girls and the gayly-dressed peasants and vendors, recalling days of long ago.

Only a few remains are now visible of the wall of sixty-four towers, which once encircled the city. The greatest ornament of Seville is its cathedral, built in 1401-1519, on the site of

a Moorish mosque. It stands in the central square and is the third largest cathedral in Europe. Near by is the Court of Oranges, with a fine fountain in the center, encircled by a grove of orange trees. There also stands the beautiful Campanile, or bell tower, called Giralda, which is almost 300 feet high. Surmounting it is a Christian bell tower, at the top of which, like a weather vane, turns a colossal statue of gilded bronze; this tower has twenty-two sweet-toned bells. Another of the glories of Seville is the Alcazar, an ancient palace of Moorish kings. Other interesting buildings and public institutions are the House of Pilate, with marvelous courts and grand halls; the Museum of Paintings, containing masterpieces by Murillo, Velasquez and other artists of the Seville school; the Exchange, built in 1585 and housing the archives of the Americas; and the Columbian Library, founded by the son of Columbus.

Although Seville no longer lays claim to the title of "Spanish Athens," which it once so proudly bore, it is still a great intellectual center. Next to Madrid it is the most flourishing city in art, literature and university education in Spain. It is rapidly recovering much of the commercial prosperity which it enjoyed in the seventeenth century, when it was the chief port of Spanish commerce, and has built up an extensive industry in the production of cigars and the manufacture of pottery, cannon, silks, cotton and numerous other commodities. Population, 1911, 155,360. R.D.M.

SEVRES, *seh'vr'*, a small town in Northern France in the department Seine-et-Oise, southwest of Paris, from the outer fortifications of which it is about three miles distant. Sevres is celebrated for the manufacture of the porcelain bearing this name, and for its stained glass and mosaics. The Porcelain Museum, which is one of the chief features of the town, contains a large and interesting collection of china and earthenware assembled from all parts of the world. The porcelains of Sevres have been the admiration of Europe since the first days of their production at Vincennes, their original home. In 1756, for want of space, the industry was transferred to Sevres and placed under state control. Many famous artists were employed to decorate the plaques, enormous vases and ornaments of all kinds, which are still the treasures of collectors. However, the market is now being flooded with spurious works made in Germany and England, which are very clever imitations of the original. Population of Sevres in 1911, 8,395.

SEWAGE AND SEWERAGE, *su'ayj, su'er ayj*. Sewerage is a system of pipes and conduits constructed for conveying waste matter, known as sewage, from houses and factories and depositing it at a safe distance from centers of population. Sewers also drain off either the whole or a part of the surface water of land; in this connection they are more commonly known as *drains*. A single system of conduits carrying both sewage and rainfall is known as the combined system. The most satisfactory system, however, supplies separate pipes and conduits for surface water. Where the combination plan is used it is not uncommon for sewers, choked by the sudden influx of rain water, to discharge sewage backward into cellars and basements.

In the great cities of the modern world, the disposal of sewage is a problem of first importance, and proper methods are indispensable to preserve the health of the community. Sanitary methods of disposal have, therefore, received increased attention from engineers, health departments and municipal officers generally. Marked improvement has resulted.

The commonest type of sewerage system is the so-called water-carriage system, in which waste materials are diluted with water and conveyed away from town or city by natural flow, or gravitation. The sewage is conducted through pipes of varying caliber from private homes to public conduits of considerable diameter and discharged at a distance, often into streams or into the sea. On the farm or in small villages, it is practicable to dispose of waste in the soil, but such methods will not serve in dense centers of population.

The house drain, which is of glazed stoneware, from four to six inches in diameter, discharges its matter into somewhat larger pipes of earthenware or cement, and these in turn empty into larger conduits of brickwork or cement, called *mains*. The ordinary sewer pipe is made of salt-glazed, vitrified earthenware, having a smooth surface so as not to impede the flow. It is made in short lengths, having a socket at one end into which the next length of pipe is fitted. A bit of hemp packing and Portland cement close the joint.

The larger sewers, or *conduits*, are constructed of several layers of brick resting on a cement bed, or of cement itself. Their diameter may be very great, to accommodate populous neighborhoods. All the pipes of the system are set at a uniform gradient so as to give a steady flow, which should be at least 2½ feet

a second. Where the ground is quite level, it is sometimes necessary to facilitate the flow by means of pumps. The decomposition of sewage gives rise to poisonous gases, and in the interest of health sewers are ventilated; that is, shafts with iron gratings are placed at frequent intervals so that air may reach the conduits. When these are large enough to permit a man to descend to clean or inspect the sewer, they are called *manholes*. Such manholes are placed at each change of direction of the conduits and at junctions with the branches. Not all the gas, of course, escapes through the shafts; it is customary, therefore, to protect sinks and washbowls from an influx of gas by fitting an elbow in the pipe, which holds enough water to exclude noxious fumes.

When cities are situated on the seaboard or the shores of large lakes, the sewerage system usually empties into deep water. Rivers are also used for this purpose, for it has been proved that after a flow of five miles through running water thorough purification has resulted. With the enormous growth of American and Canadian cities, however, this generally prevailing practice has sometimes resulted in a certain amount of water pollution, due to vast quantities of sewage and lack of sufficient water to purify it. Of recent years increased attention has been given to scientific methods of sewage disposal practiced in England and on the continent of Europe. There the sewage is often treated with chemicals in huge tanks, lime alone or lime in conjunction with aluminum or ferrous sulphate being used as a purifier. Septic tanks and contact beds or sand and percolating filters are becoming increasingly common. In the tanks, bacteria convert harmful organic matter into harmless minerals. Contact beds are water-tight compartments, filled with broken stone or clinkers, in which the sewage is acted upon by bacteria and purified. Such methods of clarifying sewage are expensive and have not yet been widely adopted in the United States or Canada.

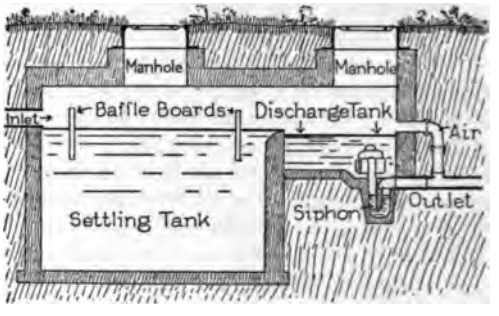
Besides the sewage, there is a considerable amount of waste matter, such as ashes and garbage, which cannot be disposed of by the sewerage system. This is collected in carts and burned at incinerating plants or deposited where it cannot do harm. In the more scientific method of disposal, reduction plants convert much of this waste into grease and other salable commodities. G.B.D.

Consult Kershaw's *Modern Methods of Sewage Purification*; Easdale's *Sewage Disposal Works*.

Related Subjects. The reader is referred to the following articles in these volumes:

Garbage	Sewage Disposal on Farms
Sanitary Science	Well Boring

SEWAGE DISPOSAL ON FARMS. Owing to engineering progress, people now dwelling in the rural districts may without undue expense enjoy the convenience of running water in the home. Many farmers and suburban dwellers,



A SEPTIC TANK

Sewage enters at one side and is prevented by the baffle boards from causing a direct flow across the tank. When the settling tank is full any excess trickles into the discharge tank. As this gradually fills, the air in the cap of the siphon is compressed until it suddenly forces out the contents of the siphon, drawing after it the water in the discharge tank. The pressure of the air in the air pipe prevents the absolute exhaustion of water from the siphon, which would cause a gradual instead of a sudden discharge.

however, though aware of their ability to install pumping machinery, refrain from doing so because they do not know what to do with their sewage. But here, too, science has come to their aid, by devising schemes for employing the purifying forces of nature.

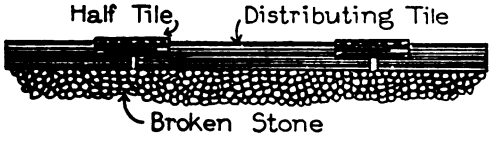
The chief danger from unscientific handling of drainage, as in carelessly built, old-fashioned cesspools, is, of course, contamination of wells. But under the system here described, and under many others which have been designed by scientific men for special conditions, sewage may be handled with even better results than are obtained in cities.

This system combines what is known as a *septic tank* and *subsurface irrigation*. Its effectiveness arises from the fact that in all surface soil there are certain bacteria which are able to render waste matter harmless if it is liquefied and well distributed.

The sewage first enters the septic tank, which is closed both to air and to light, and here in a period of twelve hours or more its own bacteria break up most of the solid matter. The tank is usually of brick, concrete or steel, and ought to be far enough in the ground so that

its contents will not fall below the temperature of 60° F. If the size of the tank is properly proportioned to the amount of sewage it will not be necessary to clean it except at long intervals.

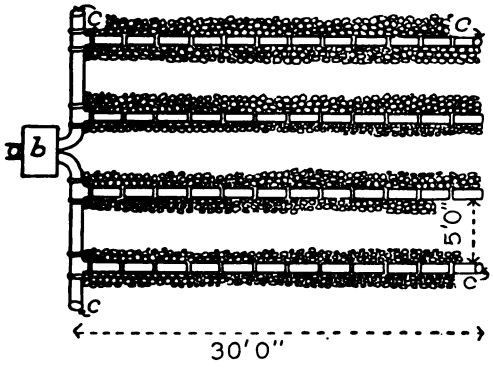
About four times a day a part of the contents of the tank is discharged into the distributing



THE TILES

The distributing tiles are about eighteen inches below the surface, and slope gradually away from the pit. In heavy soil, or in regions where frost penetrates deeply, they should be laid in crushed stone or cinders, as shown. In some cases it is also advisable to have drain pipes beneath this porous foundation. The tiles are laid as illustrated, with their ends about half an inch apart, the half tiles being added on the upper side of the joints to keep out sand and dirt.

pipes, as explained beneath the second picture. The suddenness of the action causes the liquid to be distributed through all the pipes, whence it seeps into the soil and is taken care of by nature. Heavy soils may in the course of a week or two become saturated, so that the bacteria are unable to do their work; for this reason the distributing system is designed in two parts, so that the flow can be given to one section of the soil for several days while the other part rests. C.H.H.



SUB-SURFACE IRRIGATION

(*a*) Pipe from septic tank; (*b*) distributing pit; (*cc*) fresh air inlets.

The total amount of tile should be more than one lineal foot for each gallon flowing from the tank in a day. The distributing pit is a small brick chamber with an inlet at the back and two outlets at the front, either of which can be closed.

SEWARD, *su'erd,* WILLIAM HENRY (1801-1872), an American statesman, Secretary of State during the War of Secession, and an efficient aid of the President in the councils that determined the policy of the nation during that struggle. He was born in Florida, Orange County, N. Y., and was educated at Union College. After practicing law for several years he gradually became prominent in politics, serving as governor of New York from 1838 to 1842, and in 1849 entering the United States, Senate, where he became influential as a party leader. He firmly resisted the extension of slavery and distinguished himself by his eloquent speeches opposing the Compromise of 1850 and the Kansas-Nebraska Bill.

WILLIAM H. SEWARD

He sought the Presidential nomination in 1860, but Abraham Lincoln won it. Seward became the great Secretary of State of Lincoln's Cabinet, but was held up to ridicule when he purchased Alaska—"Seward's frog pond"—from Russia. It proved to be one of the best investments ever made.

In 1860, when he was defeated by Abraham Lincoln for the Presidential nomination, Seward exerted himself to secure Lincoln's election, and later was appointed Secretary of State. In this high office he reorganized the diplomatic service and succeeded in preserving the confidence of Europe which had been ready to give support to the Confederacy. On the night of Lincoln's assassination, Secretary Seward was confined to his room by a fall from his carriage, but he was also a victim of the conspiracy and was seriously wounded by an accomplice of Booth. He slowly recovered and served as Secretary of State under Andrew Johnson, continuing in office until the inauguration of President Grant. Among the important tasks that he accomplished were the adjustment of the Trent Affair (which see) and the Alabama Claims (see ALABAMA, THE), and the negotiation of the treaty by which Alaska was purchased from Russia.

SEWING, *so'ing.* In the days of our grandmothers the sewing connected with the furnishing of the home and the clothing of the family was as much a part of every woman's daily task as was the setting of the table or the making of the beds. Often these good and capable housewives took the flax from the plant or the wool from the sheep and spun it into the yarn and then wove it into the cloth which was used

for making towels, sheets, tablecloths, or any of the household linens or for clothing for the family. There have been times when every article, excepting the boots or shoes but including the straw hats as well as the men's suits and other articles of wearing apparel, have been fashioned by our grandmother's hands. She braided the straw, and from the raw fiber she spun the yarn and thread and wove the cloth; then she cut and made every article. In those days the spinning wheel and the loom were seen in every home. It is such a picture Longfellow gives us in *Evangeline* when he says:

Close at her father's side was the gentle Evangeline seated,
Spinning flax for the loom, that stood in the corner behind her.
Silent awhile were its treadles, at rest was its diligent shuttle,
While the monotonous drone of the wheel, like the drone of a bagpipe,
Followed the old man's song and united the fragments together.

And again, later in the same story, how much these words tell us of the women of that day:

Simple that chamber was, with its curtains of white and its clothes press
Ample and high, on whose spacious shelves were carefully folded
Linen and woollen stuffs, by the hand of Evangeline woven.
This was the precious dower she would bring to her husband in marriage,.
Better than flocks and herds, being proofs of her skill as a housewife.

A Revolution in Production. But in the beginning of the nineteenth century great changes came about in the social and economic life of the American people. The growth of purely industrial activities and the rise of manufacturing centers and the growth of cities brought about a complete revolution. Mills and factories sprang up all over the eastern part of the continent, and soon the rag carpets and the beautiful coverlets and the homespuns were laid away in the attic or given away, and their place was taken by the new commercial products.

But this was not all. The girls and women found employment in these factories and soon the arts of the home—sewing and cooking, sometimes called the Home Sciences—were rapidly becoming lost arts. Not only were spinning and weaving forgotten, but even plain sewing and mending were no longer familiar subjects to the girl; and since such a very large percentage of girls marry and have homes and families, this ignorance was soon very evident. When the women of the country realized the existing conditions, it was apparent to some of them that a solution must be found by which sewing could be revived and encouraged. The home had given up teaching the girls how to sew, and since this knowledge is so necessary to a girl's complete education, the school was considered the logical place for such instruction.

The women of Boston, assisted financially by Mrs. Hemenway of that city, were the first to succeed in having sewing taught in the schools. That was in 1854. The legislature of Massachusetts legalized the teaching of sewing in 1876. From this modest beginning the teaching of sewing has spread until it is included in the course of study of every up-to-date elementary, high and normal school and of most colleges. There are many commercial institutions specializing in the teaching of sewing, and new books on the subject are being added to the list every week. There are also many courses in sewing offered by correspondence schools.

To-day no girl's education is complete unless it includes enough instruction in sewing to enable her to prove her skill as a housewife, to be able to purchase materials intelligently, to appreciate what is good in design, what material is appropriate for each garment or household article and the proper clothes for all occasions. Every girl should know how to make her own clothes and also how to alter ready-to-wear clothing and add those little touches which make her clothes individual and characteristic of the well dressed woman. The courses and instruction offered have done so much to revive the appreciation of sewing that we find such quotations as the following, taken from Porter's *Laddie:*

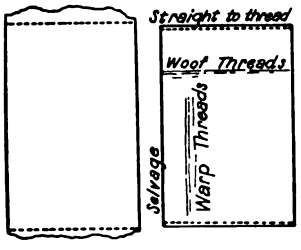
The gay belles of fashion may boast of excelling
In waltz or cotillion, at whist or quadrille;
And seek admiration by vauntingly telling
Of drawing and painting and musical skill;
But give me the fair one, in country or city,
Whose home and its duties are dear to her heart,
Who cheerfully warbles some rustical ditty,
While plying the needle with exquisite art;
The bright little needle, the swift-flying needle,
The needle directed by beauty and art.

The location of the school, the economic condition of the people, their customs, the fashions of the day and the aim sought, largely determine a course of study in sewing for the girls of any institution.

Hand sewing should be taken up first, and the student should become familiar with all the stitches used in plain sewing. There are articles

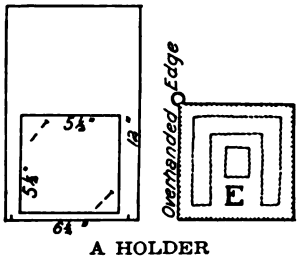
without number in which these stitches are used, and the following course gives only a suggestive list.

A Dish Towel. This problem includes a study of the fiber of which the material is made; this may be cotton or linen or union. (See COTTON and FLAX in these volumes.) The terms *warp, woof, selvage* and *hem* should become familiar to the student, through the dictionary. The plain stitches—basting and hemming—should be mastered in this article, and it is well to add a personal touch such as an initial in an ornamental stitch; either the chain or outline stitch is appropriate.



DISH TOWEL

A Holder (for lifting hot dishes). This article should be made of crash or of unbleached muslin, and should be constructed in such a way as to insure good results after frequent laundering. The finished holder should measure five and one-half inches each way, thus affording excellent practice in measuring, folding and basting. In addition to the work given in the first problem, overhanding on the edge and the running stitch to hold the padding in place is given. A ring or buttonholed loop for hanging should be inserted in one corner.

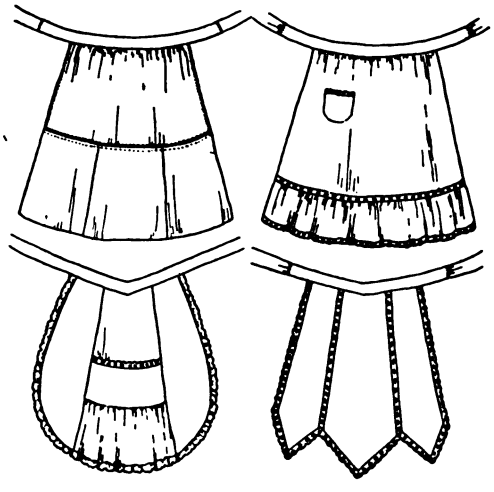


A HOLDER

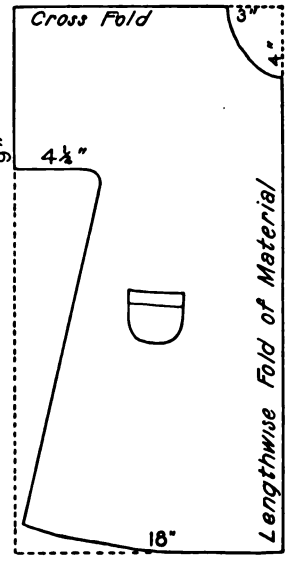
The Sewing Apron. This is a lesson in designing, cutting and making. The accompanying sketches are suggestive of a few of the many styles that may be used in the making of this garment. The study of good proportions and a little experimenting with tape measure, scissors and paper will enable the student to cut any of the patterns. The student should study the finer cotton materials, making a collection of samples, giving the name, width and price of goods suitable for the making of a dainty sewing apron. Some of these materials are flaxon, dimity, dotted Swiss, cross-barred muslin, lawn and organdie.

The new problems in this project are gathering and putting on the band, the making of French seams, joining the ruffle and the whipping on of lace.

Problem in Machine Work. Following the sewing apron there should be plenty of machine practice. A slip-over cooking apron or night-


SEWING APRONS

dress or a kimono afford excellent opportunity for long-seam stitching. The sketch shows an easy draft for the cutting of a cooking apron or nightdress. If one wishes, the cooking apron may be cut up the back and faced with a straight piece of material and fastened with buttons and buttonholes. The neck should always be finished with a bias facing. A belt adds a finishing touch.



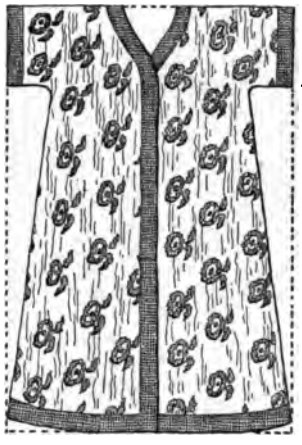
PATTERN
For kimono, apron or nightgown.

Percale, cambric or longcloth are suitable materials for the apron, any of the materials discussed under *Underwear*, below, are the best for the nightdress. The beautiful and artistic cotton crapes are chosen for the kimono.

Study of Commercial Patterns. Every firm putting paper patterns on the market has an

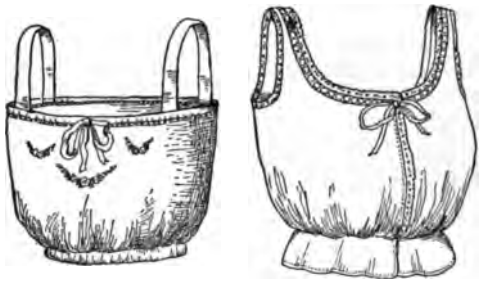
expert in charge of the work; a careful study of the printed matter on the pattern and the accompanying chart will enable the student to cut the garment without mistakes or waste of the material.

The pattern should be carefully measured and the alterations made as directed before it is placed on the material; never trust to making the necessary alterations when fitting the garment. The other most important caution is to observe the markings of the pattern for placing on folds and on lengthwise threads of the material. In addition, one should place the material so that the nap of the cloth will lie in such a position that it will be flat when the garment is brushed downward. Many a garment owes its poor fit to the careless placing of the pattern.



KIMONO
Cut from pattern in preceding picture.

Underwear. Every possible effort should be put forth to make and keep underwear dainty and beautiful. Narrow facings, hems and tucks, handmade laces, bits of hand embroidery and

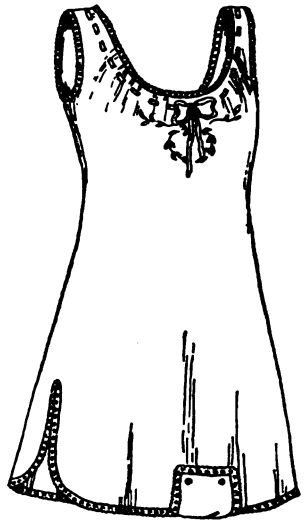


CAMISOLE AND CORSET COVER

snowy ribbons should appear here. If a bit of color is desired, only pale pink or baby blue are to be used.

Narrow, flat seams in garments that come next to the body and French seams measuring from one-eighth or less to a quarter of an inch in width in the other garments are used in underwear. These seams require much skill—in fact, so much skill that in some technical schools this phase of sewing is given during the last year of the course and ranks with fine baby clothes in the requirement of technical skill.

Just as much care should be taken with the fitting of an undergarment as with a dress. Bands should be exactly the right size, fastenings should be placed in their proper places, and attention should be given to every detail of the work. One-piece plackets are usually used, and these should be narrow and neatly fitted and finished.



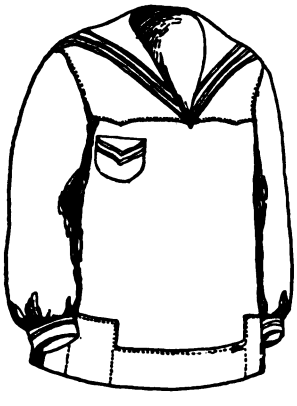
ENVELOPE CHEMISE

All buttons should be as small and inconspicuous as will answer the purpose. Buttonholes are to be worked with the greatest care. No part of sewing marks a careful and expert seamstress more surely than does the buttonhole. The purl is made by bringing the thread from the eye of the needle around the point in the direction in which one is working, thus forming a double knot. Holding the thread so that the needle is brought through a loop makes the blanket stitch; but this does not wear nearly as well as the buttonhole stitch.

COMBINATION CORSET COVER AND PETTICOAT

The personal taste of the wearer and the amount of time and money she wishes to put into the garment determine the style and material of much of the underwear. Longcloth, French or English nainsook, Berkley cambric and crape are suitable and serviceable cotton cloths which launder

nicely and always look well. Crêpe de chine, satin, ribbons and laces are worn under thin, delicate waists and dresses. The camisole, which is in great favor in the place of the corset cover, is usually made of these more expensive materials. The envelope chemise is easily made and laundered, and is especially suitable for young girls and slender women. The kind of a dress to be worn and the prevailing fashions determine the style of the underskirt. Sateens, white wash materials, embroideries or silk are appropriate for this garment.



MIDDY BLOUSE

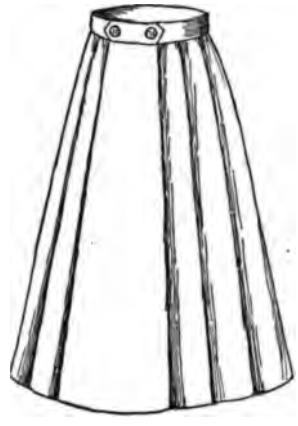
Middy, Smock or Blouse. If the student has followed each step of the work in the order given she has gained knowledge, skill and confidence; she will experience no difficulty in the making of the middy, smock or blouse, and is now capable of working with any kind of material. Middies and smocks are usually made of washable cotton goods, but these garments, with a simple skirt, are used for sport suits, and then the materials range from the very inexpensive cottons to silks, such as crêpe de chine or glove silk.

A stamping pattern for smocking may be purchased separately or is included in the regular smock pattern. The directions for the various stitches are clear and simple, and the student should not hesitate to try any pattern, however intricate it may appear.

BLOUSE

The lingerie blouse or shirt waist offers excellent opportunity for fine tucking and lace insets, as well as for a review of the work that has been done in making some of the previously mentioned garments.

Outside Skirt. A skirt to be worn with any of the foregoing garments may follow, and the middy or blouse or smock determines which material is the most suitable. The skirt may match the other garment exactly, or it may be made of wool or of a different kind of silk. If wool is chosen, plain seams, carefully overcasted, should be used, and special attention should be given to the pressing.



PLAITED SKIRT

A faced and extension placket is used in the wool material, but the one-piece placket is suitable for the thinner kinds of goods.

The seams should be entirely finished and pressed, and the skirt should be set into the band with all fastenings in place; then the garment may be placed on the wearer and the measure taken from the floor when turning up the skirt at the bottom. Do not trust to pinning to the waistline or tieing with a tape when taking this measure.

DRESS

Afternoon Dress. The afternoon or evening dress should be charming in its simplicity of line and decoration. In this day of exquisite weaves and patterns in all kinds of cloth, there is a great latitude of choice for this dress. The figure of the wearer is of great importance in the choosing of the material for the dress. Always remember that vertical lines appear to add to the wearer's height, and that horizontal lines seem to shorten the height. The fashion, too, changes, demanding plaids and checks at one time, and at another time plain or flowered materials. Study the market carefully in making your choice, then find a simple, becoming pattern, and the work is well

begun. All plaids and checks should be carefully matched. Let the ornament of the dress be part of it and never appear "tacked on."

Mending. No course in sewing could be complete without consideration of the important subject of mending. Stocking darning is skilful weaving with needle and darning cotton to supply the worn material. This prolongs the use of the stocking indefinitely, and the skilful darner is able to economize by her work more than one would expect.

The hemmed-on patch and the set-in patch are used exactly as the names indicate. Darning of dresses and table linen is an art which practice alone makes perfect. E.M.P.

Consult Wakeman and Heller's *Scientific Sewing and Garment Cutting.*

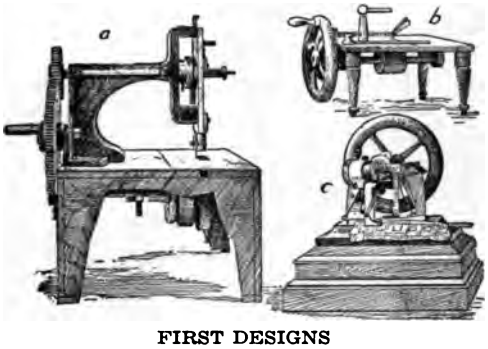
Related Subjects. In connection with this article on sewing, the reader may refer to the following topics in these volumes:

Button	Gingham
Calico and Calico Printing	Industrial Art
Costume	Lace
Cotton	Linen
Dimity	Muslin
Dress	Satin
Flax	Silk
	Wool

Also such collateral household subjects as

Domestic Art	Home Economics
Embroidery	Household Arts in Education

SEWING MACHINE, *so'ing ma sheen'*, a device that has lightened the household labors of mothers in every civilized country and made possible a stupendous development of the clothing industry. One usually thinks of Elias Howe



FIRST DESIGNS

(*a*) The Singer; (*b*) Wilson's earliest pattern; (*c*) the sewing machine of Elias Howe.

(which see) as the inventor of the sewing machine, because his model, which was patented in 1846, was the first practical machine successfully put upon the market. At least two other men, however, had previously worked out the idea of a device to take the place of hand sewing. The first, an Englishman named Thomas Saint, patented a wooden machine in 1790 which made a single-thread chain stitch. The thread was automatically fed to the needle, which had a notch instead of an eye, and an awl made holes for the needle to pass through. This machine, however, did not give practical results. Forty years later a Frenchman, Barthélemy Thimonier, patented a machine that was actually used to make soldiers' garments. The French government had eighty of his machines in use at one time, but a misguided mob of workmen wrecked the factory and almost killed the inventor, and Thimonier was never again able to create public interest in his device. He used a hooked needle that made a stitch by passing backward and forward through the cloth.

Howe's machine, upon which all double-threaded models of to-day are based, had a needle with an eye near the point. A shuttle, below the cloth, carried a lower thread on a small bobbin, and the needle was fastened to an arm that vibrated on a pivot; its movement forced the needle through the cloth, producing a lock stitch. Nearly all domestic machines of to-day are of the double-thread, lock-stitch type, though some housewives prefer the single-thread chain-stitch machine, such as the Wilcox and Gibbs. The lock stitch is much like weaving in formation, and is less likely to ravel than the chain stitch, which is something like the stitch in knitting. Of the inventors who followed Howe, A. B. Wilson and Isaac Singer deserve special mention. The former introduced the four-motion automatic feed used on nearly all modern machines, and the latter the treadle operated by foot, and a presser foot with a yielding spring, which holds the fabric down on the feed plate.

Sewing machines are now made in hundreds of varieties for every kind of sewing imaginable. Fine hand sewing and hand embroidery are being imitated by machines which will stitch in any direction; other machines do hemstitching and tucking and hemming, sometimes with twelve needles in a row on one machine; other machines make buttonholes, and still others sew on buttons. There are special machines for sewing boots and shoes, books and umbrellas and brooms. There is even a very ingenious machine for sewing carpets together; this travels along the carpet it stitches because the carpet is too heavy to be easily moved. B.M.W.

Consult Byrn's *Progress of Invention in the Nineteenth Century;* Hasluck's *Sewing Machines.*

:'TANT, an instrument for measuring ngular distance between any two points, as the sun and the horizon. It is used commonly by sailors in determining the n of a ship at sea.

A SEXTANT

extant consf a frame rting the ated arc of h part of a a radial traveling his arc, two ors and a l telescope. ixed mirror own as the *n glass,* because it is trained on the horihe movable mirror, screwed to the head radial arm, or index bar, is called the *glass.* The purpose of the telescope is to sharpen the line of the horizon. In the sextant, the operator, holding the of the arc vertical, looks through the ope at the horizon glass, which is held point where earth and sky seem to meet. he moves the index arm until the image n or a star, reflected in the index glass, s the horizon line. The sun's altitude e read from the graduated arc, slight cors being made for refraction and other

principle underlying the use of the sexs a rule in optics: If an object be seen eated reflection from two mirrors perpen: to the same plane, the angular distance object from its image is double the inon of the mirrors. In reading the graduarc, therefore, half degrees are taken as s, because what is really measured on the is the angle between the mirrors, and this the distance between the objects. The n of the star in the celestial sphere being , it is possible to determine the latitude hip by comparing its altitude with this n.

.CKLETON, *shak''l ton,* SIR ERNEST), an Antarctic explorer, born at Kileland. He was sent to Dulwich College, s love of the sea was stronger than his books, and he left college without finishs course. Four times he sailed around rld before his appointment, in 1901, as ieutenant of the National Antarctic Exn. From 1904 to 1906 he was secretary easurer of the Scottish Geographical Society, and in the latter year made an unsuccessful attempt to enter Parliament from Dundee.

In 1907 Shackleton was placed in command of the British Antarctic Expedition, and landed in 1908 at Erebus Island, South Victoria Land. Here he spent the winter, sending out sledge parties of exploration. Mount Erebus was ascended, and an expedition, one of the most remarkable sledge exploits ever recorded, was undertaken over the Antarctic continent. On January 9, 1909, the party reached latitude 80° 23′, a point only 111 miles from the South Pole. The elevation here was 11,600 feet, and the wind and storms were of great violence; this fact, in conjunction with a shortage in food supplies, compelled the party to turn back when so near the goal. Shackleton was knighted on his return to England and was presented with numerous honors and medals by societies in all parts of the world.

SIR ERNEST SHACKLETON

Late in December, 1914, the explorer sailed from South Georgia, in the South Atlantic, beginning then an expedition that was destined to be one of the most thrilling in the history of polar research. The hardships and perils of this journey are described in detail in these volumes in the article POLAR EXPLORATION (page 4729). Shackleton returned to England in the spring of 1917, to aid his country in fighting the great war. He passed through the United States on his homeward journey, lecturing there to large and enthusiastic audiences.

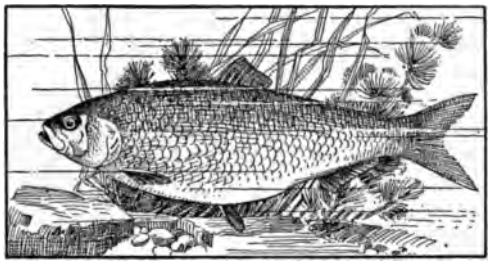
Consult Shackleton's *Heart of the Antarctic.*

Related Subjects. The reader is referred to the following articles in these volumes:

Amundsen, Roald	Ross, James Clark
Polar Exploration	Scott, Robert Falcon

SHAD, an important food fish of the herring family, ranking in economic importance next to the salmon and the cod among the fish of the United States. The common, or American, shad is found from Newfoundland to Florida and has been introduced into the Pacific coast waters by the Bureau of Fisheries. It is primarily a sea fish, but ascends fresh-water rivers

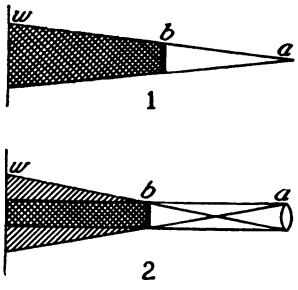
to spawn, and at that time large numbers are caught in seines or nets. Of late years the annual catch in the United States has been about 25,000,000 pounds. These fish are eaten fresh for the most part, but a few are smoked or salted in brine. Their eggs are sometimes used in making caviar (which see), as they are the best substitute for the roe of the sturgeon,



THE SHAD

commonly employed for that purpose. Shad roe when fried is considered a great delicacy. Shad are larger than herring, averaging about three pounds in weight and from two to two and a half feet in length. They are bluish above with silvery sides and have deep, compressed bodies. See HERRING.

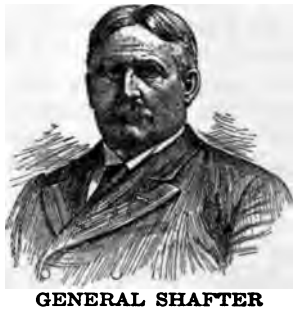
SHADOWS, *shad'ohz.* When a ray of light strikes an object through which light cannot pass, that is, an opaque body, a darkened space may be seen behind the obstructing object. Such a space is known as a *shadow.* Shadows are formed constantly everywhere. We see shadows of clouds on the meadows and on bodies of water, shadows of trees and buildings, and shadows of ourselves. The light of the sun upon the earth causes our planet to throw a huge shadow into space, and when the moon passes into this darkened area it may be partially or completely eclipsed (see ECLIPSE). Both lunar and solar eclipses have to do with shadows formed on a gigantic scale.



SHADOWS
Explanation of the figures appears in the text.

The accompanying diagram illustrates the formation of shadows. In Fig. 1 the source of light is a luminous point, *a.* An opaque body *b* intercepts the ray of light from *a,* and the space between *b* and the screen *w* is in the shadow. As the light is totally excluded, the space is completely darkened, and an *umbra* is formed. In Fig. 2, *a,* the source of light, is an area of considerable dimensions. In this case the space behind *b* consists of a totally darkened region, or umbra, and of a region where only part of the light is cut off. This latter section, illustrated by oblique shading, is the *penumbra.* See LIGHT.

SHAF'TER, WILLIAM RUFUS (1835-1906), an American soldier, distinguished for his services as commander of land operations in Cuba during the Spanish-American War. His forces, in the course of a month's fighting, captured Santiago and the entire eastern section of the island (see SPANISH-AMERICAN WAR). Shafter was born at Galesburg, Mich., and received only a common school education. He won a Medal of Honor during the War of Secession at the Battle of Fair Oaks, on May 31, 1862, having fought valiantly throughout the entire day although severely wounded. He became major of the Nineteenth Michigan Infantry in 1862, was promoted lieutenant-colonel in 1863, became colonel of the Seventeenth United States Colored Infantry in 1864, and was brevetted brigadier-general of volunteers on March 13, 1865, for gallant conduct in action. After 1866 he was in the regular service. At the close of the Spanish-American War General Shafter was given command of the Military Department of the East, but later was transferred to the Department of the Pacific. He retired in 1901 with the rank of major-general in the regular army.



GENERAL SHAFTER

SHAFTESBURY, *shafts'beri,* ANTONY ASHLEY COOPER, First Earl of (1621-1683), an English statesman who forced the passage of the Habeas Corpus Act. He rose to great prominence during the Commonwealth and after the restoration of Charles II. The son of John Cooper of Wimborne, Dorsetshire, he entered Parliament before his twenty-first birthday and showed an inclination to side with the royalists, but afterwards became one of the most decided Parliament supporters and active in the field against the king, whose final defeat he helped to bring about.

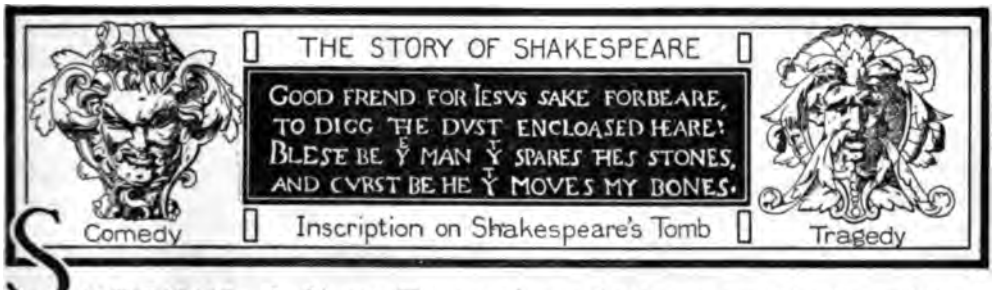
After the death of Cromwell, feeling that the people really wished for the return of royalty, he openly and strongly supported the cause of Charles II. The new king raised him to the peerage as Baron Ashley, shortly afterwards making him Earl of Shaftesbury and lord chancellor.

He was a member of the Cabal and supported the Test Acts in favor of Protestants, for which he lost his office. Through false witnesses he was given an opportunity to persecute the Catholics, and through him five peers were sent to the Tower of London and over 2,000 other persons were imprisoned. He supported the duke of Monmouth and was deserted by his friends. Later he was arrested on a charge of high treason, but released, and entered into further conspiracies until he had to flee to Holland, where he died.

SHAH JEHAN, *shah je hahn'* (about 1592-1666), the fifth ruler of the Mogul Empire in India, famed as the builder of one of the most beautiful structures ever erected—the Taj Mahal, a mausoleum of the emperor's favorite wife. Shah Jehan brought Mohammedan architecture in India to the height of its glory. He founded the modern city of Delhi (which see), and erected there a splendid group of buildings constituting the imperial palace; in one of the buildings stood a throne bearing a marvelously-wrought peacock's tail composed of precious stones. The Pearl Mosque, at Agra, where the Taj Mahal also is located, is another monument to his love for beautiful architecture. Shah Jehan's reign of thirty years (1628-1658) was a turbulent one, and eight years before his death he was deposed by his son Aurunzebe. An illustration of the famous mausoleum is given with the article TAJ MAHAL.

SHAKERS, or **SHAKING QUAKERS,** a religious sect that first appeared in England about 1747. These people were originally a branch of the Quakers, and were called Shakers because they shook their bodies during their religious services. One of their early leaders, Ann Lee, who claimed that she was the reincarnated Christ, settled in America in 1774 with a few converts and set up a small church near Watervliet, N. Y. In 1787 the society was made communistic, and was thus the first organization on that basis in the United States. The seventeen existing communities are found in New York, Massachusetts, New Hampshire, Connecticut, Maine, Ohio, Kentucky, Georgia and Florida. The largest community is at Mount Lebanon, N. Y., twenty-five miles southeast of Albany. There are probably not more than 500 Shakers at the present time in the whole country.

Shakers hold many of the views of the Quakers and, in addition, practice celibacy, hold their property in common and keep themselves separate from the world. One of Ann Lee's maxims reads: "Put your hands to work and give your hearts to God;" obeying this injunction, the Shakers have always been industrious, believing that work is a help toward attaining the sinless life which they consider to be obligatory. A Shaker village usually consists of two or more "families" of thirty or forty persons. To each "brother" is assigned a "sister," who cares for his clothing and otherwise makes him comfortable. Greatest emphasis is put upon circumspect conduct. Their religious services are not formal, but include a rhythmic march that is supposed to be a survival of the more violent "shakings" of an earlier day.



SHAKESPEARE, *shayk'speer,* WILLIAM (1564-1616), the greatest of English poets and dramatists, and according to most critics the greatest literary genius the world has ever known. Of his life comparatively little is known, for his own age did not regard him as a supreme genius and made no attempt to keep the record of his sayings and doings; but to-day the world would give much for such a detailed account of him. There is, however, a certain

fitness in the scantiness of the knowledge about him. It seems to confirm his right to the place apart from and above the world of petty affairs to which his genius has elevated him.

> Others abide our question. Thou art free.
> We ask and ask. Thou smilest and art still,
> Out-topping knowledge,

wrote Matthew Arnold; and while books without end have been written about Shakespeare and his works, no critic has ever felt that he has exhausted his richness or solved the mystery of his genius. For he was but a poor country boy, not well educated according to the standards of his day; yet he produced plays in great number which each generation of readers finds more wonderful than the last.

His Life Story

Shakespeare was born at Stratford-upon-Avon, Warwickshire, in April, 1564. The exact date of his birth is unknown, but since it was customary to baptize babies when they were three days old, and he was baptized on April 26, there is reason for regarding April 23 as his probable birthday. His father, John Shakespeare, was a glover, but he seems also to have carried on a prosperous trade in meat, leather, corn and other agricultural produce; his mother Mary Arden, was a farmer's daughter of Wilmcote, and it seems probable, from certain documents to which she affixed her "marke" instead of her signature, that she could not write her own name.

Youth and Training. Of such a family, in a village which lies in the center of one of England's most beautiful regions, William Shakespeare was born, the third child and eldest son in a family of four sons and four daughters. Since his father was well-to-do, it is probable that the boy attended, between the ages of seven and fourteen, the grammar school of Stratford; somewhere, certainly, he picked up that "small Latin and less Greek" which Ben Jonson declared him to have possessed. But books were not his best teachers. The men and women around him, whether they were of high or of low estate, were to him volumes of absorbing interest, which he read eagerly and intelligently. For how else could he have made himself, what he undoubtedly was, the greatest master of the mysteries of human nature that has ever lived? The beauties of the world about him, too, he saw with observant eyes; and every "winking Mary-bud," every "morn in russet mantel clad" which left its picture on his heart and brain lives for his readers in his works.

It seems probable that when William was about fourteen his father lost his property and his official position, and that the boy had to leave school and help support the family. What his occupation was is unknown, but it seems to have been lucrative enough to have warranted him, at the age of eighteen, in marrying Anne Hathaway, a women eight years older than himself. A daughter, Susanna, was born to them in the next year (1583), and two years later twin children were christened Hamnet and Judith.

His London Years. In 1585, or thereabouts, Shakespeare quitted Stratford, leaving his family there. Various theories have been invented to account for this move. Some critics believe, because there are numerous ironic references to marriage in the plays, that Shakespeare's own marriage was an unhappy one; but in just the same method it might be proved that his marriage was singularly happy, for he paints more than one picture of happy married life. The most plausible theory is that Shake-

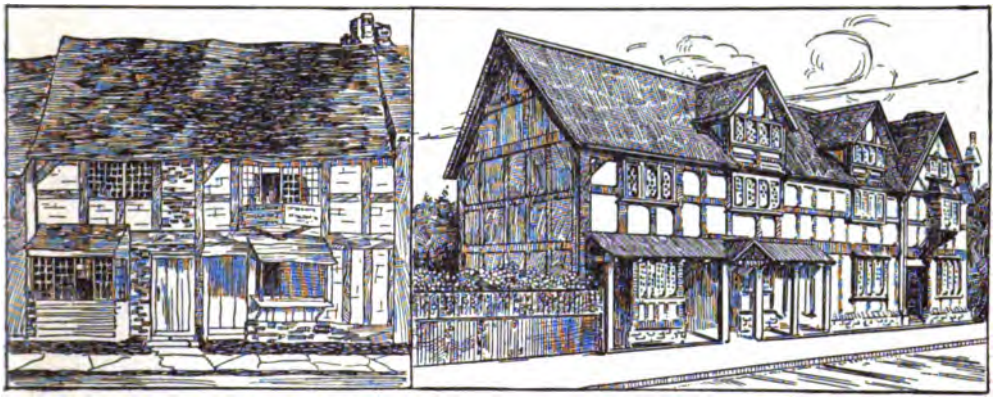
SHAKESPEARE

What point of morals, of manners, of economy, of philosophy, of religion, of taste, of the conduct of life, has he not settled? What mystery has he not signified his knowledge of? What office, or function, or district of man's work, has he not remembered? What king has he not taught state, as Talma taught Napoleon? What maiden has not found him finer than her delicacy? What lover has he not outloved? What sage has he not outseen? What gentleman has he not instructed in the rudeness of his behavior?

—EMERSON: *Representative Men.*

speare, still a youth of twenty-one or under, got into difficulty with Sir Thomas Lucy, a local magnate, by reason of some pranks, and felt it safest to leave.

However that may be, it is certain that in time he drifted to London and joined himself to a company of players. What he did at the outset is not known—probably he served in some very minor capacity and only later began to act unimportant parts. One thing, however, is evident: in Warwickshire he had been a countryman, with all sympathy for the quiet rural life about him; in London, just as surely, he became a part of the life of the time, grasping every detail of the stirring happenings about him and storing it up for future use.



THE BIRTHPLACE OF SHAKESPEARE
At left, before restoration; at right, as it appears to-day.

In 1592 appeared a reference to him in a pamphlet by Robert Greene, a popular playwright—a spiteful reference which shows that Shakespeare had become successful enough as an adapter and writer of plays to rouse envy. The years that followed brought him honor, the friendship of such men as the learned Ben Jonson and the Earl of Southampton, and a considerable measure of financial success, but not the supreme fame which later generations have conferred upon him. He himself seems to have looked upon his work as merely transient, for he made no attempt to preserve it or to collect it.

Financial success was grateful to him for one special reason. He became a shareholder in at least two of the most important theaters, but that was not the end of his ambition. All through his busy London life he cherished the desire to return to his native town and lead the life of a country gentleman. In 1597 he bought New Place, the finest house in Stratford, and some time later he added to his estate a considerable tract of farm land. His visits to the town became more and more numerous, and about 1611 he left London permanently and retired to Stratford.

Last Years and Death. The remainder of his life passed quietly with his family, and so far as can be known he wrote no more plays. In January, 1616, he made his will, in which he left to his wife the "second best bed, with the furniture." This curious bequest may by no means be taken to mean that his wife was not provided for, as by law she would have dower rights in his property.

Shakespeare died on April 23, 1616, of a fever which may have been the result of unsanitary drainage conditions in and about Stratford. He was buried in the chancel of Stratford church, and over his grave was placed a slab inscribed with the doggerel lines now famous the world over:

> Good frend, for Jesus sake forbeare
> To digg the dust encloased heare;
> Bleste be the man that spares thes stones,
> And curst be he that moves my bones.

That Shakespeare himself wrote these lines, as tradition asserts, there is no proof, and certainly they are woefully inadequate as the epitaph of the world's greatest poet. Later a monument with a bust was set up on the chancel wall.

Anne Hathaway survived her husband for seven years, and his youngest daughter, Judith, wife of Thomas Quiney, lived until 1661.

Character. Though we have no biography of Shakespeare left by his contemporaries, we have what is almost as valuable—a record of the impression which he made on one who knew him

well. The dramatist Jonson, whose jealousy might have blinded him to some of Shakespeare's good points, wrote enthusiastically of him, as follows:

I loved the man and do honor to his memory, on this side idolatry, as much as any. He was indeed honest, and of an open and free nature, had an excellent phantasy, brave notions and gentle expressions.

The Works of Shakespeare

Nondramatic Works. These were of two kinds—narrative poems and sonnets—and were in Shakespeare's own day looked upon as of greater value than his dramas. This judgment succeeding generations have by no means con-

THE ROOM IN WHICH HE WAS BORN
Its appearance at the present day.

firmed. The narrative poems, *Venus and Adonis* and *The Rape of Lucrece,* do indeed show much youthful imagination, but they deal with unpleasant subjects and have not the rapid movement which his dramas possess.

His sonnets, of which there are one hundred fifty-four, rank very high in sonnet literature. Few writers have dealt with love in a more masterly manner or have clothed their thoughts in more exquisite phrases. Much interest has been attached to them because they are the most personal of Shakespeare's works—the only ones, indeed, in which any touch of the poet's own feelings appears. All attempts, however, to trace them to their source in emotional events in Shakespeare's life have failed.

Classification of the Dramas. The simplest method of classification of these plays is a mere division of them into comedies, historical plays and tragedies. The Shakespeare critic, however, prefers to adopt a method based on chronology, because such a grouping shows the development of the creative power. In his work, thus considered, four periods stand out, which may be outlined as follows:

First Period (1588-1595). This was a period of experimentation and of comparative inexperience. The exuberance of imagination is evident, but the sure touch in character-drawing is absent, the plots are loosely constructed, and rhymed couplets often appear. To this period belong *Titus Andronicus* and the three parts of *Henry VI,* which are not entirely the work of Shakespeare; *Love's Labor Lost, The Two Gentlemen of Verona, The Comedy of Errors, Richard III, Romeo and Juliet* and *A Midsummer Night's Dream.* It will be seen that all three types of plays are represented in this list.

Second Period (1595-1600). Increased sureness of touch is noticeable in the works of this period, which also show a growing knowledge of human nature and a consequent lessening of artificiality. The plays which are usually assigned to this period are *Henry IV, Richard II, King John, Henry V, The Merry Wives of Windsor, The Merchant of Venice, The Taming of the Shrew, Much Ado about Nothing, As You Like It, Twelfth Night* and *Julius Caesar.* That is, in these five years he produced many of his greatest historical plays, one powerful tragedy, and a group of the most delightful comedies which he or any other writer ever wrote.

Third Period (1601-1608). This, for what reason cannot be known, was a period of gloom

THE ANNE HATHAWAY COTTAGE

and horror in the poet's life, and the plays reflect his feeling. They mark the very summit of the poet's powers, and include the masterpieces *Hamlet, Othello, Macbeth, King Lear, Antony and Cleopatra* and *Coriolanus.* There

were comedies, too, so called, but they deserve the name only because they have not a tragic ending; for *All's Well That Ends Well, Measure for Measure* and *Troilus and Cressida* are to the full as dark and as bitter as the tragedies.

Fourth Period (1608-1611). After the storm came a season of sunshine and of a glad serenity which brightens his last plays. These were *The Tempest, The Winter's Tale* and *Cymbeline.* They are not the greatest of Shakespeare's plays—in some ways they show a falling off in his powers; but they are wonderfully pleasing in their genial, benignant attitude toward human nature.

Sources of the Plays. Shakespeare did not invent his plots, but took them from any old chronicle, romance, play or biography that contained the proper dramatic elements. Thus Holinshed's *Chronicles of England, Scotland, and Ireland* furnished him with the material for *Macbeth* and *King Lear,* Plutarch's *Lives* was the source of *Julius Caesar* and *Antony and Cleopatra,* some old Italian romances were the basis of *Romeo and Juliet,* and a popular account of an actual shipwreck led to the writing of *The Tempest.*

But he did not merely borrow, he re-created. To the old lifeless, dry-as-dust tales he gave a new vitality, and he made the actors in those dead dramas live as truly as the men about him on the streets. He had the most truly creative imagination of any man who ever wrote, and the fact that he found his plots ready-made in no wise lessens the truth of this statement.

The Judgment of Time. Why is it that readers, not only in his own country but in others as well, have acclaimed Shakespeare the world's supreme genius? Anyone who will read his plays carefully will find the answer to this question without difficulty. First of all, he is the *universal* poet; he wrote not for one race and time, but for all, because he dealt not with transient phases of life and thought but with the deep, underlying truths. No one can read his works without finding set forth there the problems, fears and hopes that make up his own emotional life. No one can read his plays without finding his outlook on life broadened and his insight into human existence made keener.

In addition, he is the greatest master of the English language, using more than twice as many words as the second greatest writer; while the variety of his style is as remarkable as his command of words. His sailors talk like sailors, his kings talk like kings; and the fact that he can present in most realistic style the very dregs of society does not prevent his rising at times to the very heights of pure poetry.

The Shakespeare-Bacon Controversy. It was the very excellence of Shakespeare's work which led certain writers about the middle of the nineteenth century to advance the theory that he was not really the author of the plays that

SHAKESPEARE MEMORIAL THEATER
Erected by private donations on the river bank at Stratford, in 1879. Each year since then performances of Shakespeare's plays have been given here.

were credited to him. A comparatively uneducated man could not, they argued, have produced works displaying such genius and learning. The idea caught the public fancy, and book after book appeared, championing one side or the other of the question. For the most part, those who denied Shakespeare's authorship fixed upon Francis Bacon as the real author of the plays, and supported their theory by means of some mysterious ciphers which they believed themselves to have discovered in the plays. Up to the present day the controversy has raged, and some very intelligent men have supported the Bacon claim; but practically every scholar who has been trained to judgment on such questions has rejected the evidence of the Baconians and has expressed himself as thoroughly convinced that Shakespeare and no other wrote the great dramas. A.MC C.

Consult Hudson's *Shakespeare: Life and Art;* Lamb's *Tales from Shakespeare;* Corson's *Introduction to the Study of Shakespeare;* Rolfe's *Life of William Shakespeare.*

SHALE, a rock having a slaty structure, and containing a large proportion of clay. Shale was deposited on the bottoms of lakes and other bodies of water in past geological ages, and when the water was drained off it hardened into rock. Under heat and pressure, shale in some localities has been changed to slate (see METAMORPHISM). Shale is one of the most common rocks of the coal measures, and it often contains valuable fossils of the plants of the coal period. Bituminous shale burns with a flame. From another variety alum is sometimes made.

SHA'LER, NATHANIEL SOUTHGATE (1841-1906), an American geologist, educator and author. He was born in Newport, Ky. Shaler was graduated in 1862 at the Lawrence Scientific School of Harvard University, and then served two years as artillery officer in the Federal army during the War of Secession. In 1865 he became assistant in zoölogy and geology in Harvard; was appointed full professor of geology in 1887, and became dean of the Lawrence Scientific School four years later. From 1873 to 1880 he had charge of the geological survey of Kentucky, devoting part of each year to that work, and in 1884 joined the staff of the United States Geological Survey of the Atlantic Coast division. His writings embrace *Aspects of the Earth, Sea and Land, First Book in Geology, Outlines of the Earth's History* and *Man and the Earth.*

SHAMANISM, *shah'man iz'm,* a religion practiced by primitive peoples, based on the belief that the *shaman,* or witch doctor, can exorcise demons and spirits and so ward off evil and bring good to the persons for whom he performs his incantations. The ceremonies consist of weird feasts, dances, sorceries, etc., treatment in the case of the sick often being combined with the giving of medicinal herbs. This name was originally applied to the religion of the tribes of Northern Europe and Asia, but the North American Indians, with their "medicine man" and his uncanny rites, have similar beliefs concerning unseen spirits.

SHAMOKIN, *sha mo' kin,* PA., located in the rich anthracite coal region in the east-central part of the state, is a borough of Northumberland County, and a center of extensive coal-mining operations. It is forty miles northeast of Harrisburg, on the Philadelphia & Reading and the Pennsylvania railroads. Silk and knitting mills, stocking and shirt factories, wagon shops and iron works are the chief manufacturing establishments. Features of interest are a Federal building, city hall, a soldiers' and sailors' monument and Edgewood Park. The area of the borough is about one square mile. In 1910 the population was 19,588; it had increased to 21,129 (Federal estimate) in 1916.

SHAM'ROCK, a plant usually identified with the white clover, and always thought of in connection with Ireland, of which it is the national emblem. A familiar poem says:

It shines through the bog, through the brake and the mireland,
And he called it the dear little shamrock of Ireland.

On the British coat-of-arms are pictured the thistle, the rose and the shamrock growing on one stalk, for these are respectively the emblems of Scotland, England and Ireland. The clover believed to be the shamrock has leaves of a beautiful blue-green color, each made up of three leaflets (see panel illustration of the article IRELAND). Saint Patrick, so the story goes, chose this emblem because the three leaflets were symbolic of the Trinity. Some authorities say that the wood sorrel, whose leaves are very much like those of the white clover, is the true shamrock.

O, the Shamrock, the green, immortal Shamrock!
Chosen leaf
Of Bard and Chief,
Old Erin's native Shamrock.
—MOORE: *O, the Shamrock.*

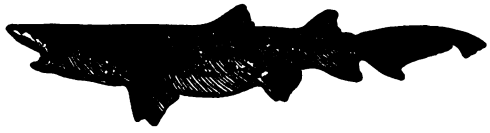
SHANGHAI, *shang'hi,* a Chinese seaport in Kiangsu province which has developed into a commercial city of first importance since it was opened to foreign trade by the Nanking Treaty of 1843. (For location, see colored map, opposite page 417.) It is a city of two distinct parts —old Shanghai, with narrow, poorly drained streets and typical Oriental houses and shops, and commercial Shanghai, where are found the foreign districts, or concessions. The native section, still surrounded by its ancient walls, stretches for several miles along the left bank of the Huang-pu River; the foreign concessions, adjoining the old city on the north, extend along the river for about three-fifths of a mile. Commercial Shanghai covers 5,362 acres

and has broad, well-lighted streets, hospitals, schools, clubhouses, theaters and other modern structures. A fine esplanade, or *bund,* skirts the river bank, and an attractive park lies opposite. By means of sanitary improvements the naturally unhealthful site has been rendered safe for foreign residents.

The city is the eastern terminal of the Hangchow and the Nanking railroads, and its spacious harbor is visited by steamships from various parts of the world. At the outbreak of the War of the Nations in 1914 over 20,000 vessels were entering and clearing the port annually, and the total yearly value of imports and exports combined was nearly $270,000,000. The city has warehouses, shipyards, cotton, silk, flour and paper mills, packing houses and other manufacturing establishments. It is an important Chinese publishing center; fifty Chinese newspapers are published here. Foreigners are under the civil, criminal and political jurisdiction of their own consuls, but the courts of Great Britain are open to citizens of any nationality. The American concession has been incorporated with that of Great Britain. In 1910 the population numbered 13,436 foreigners and 413,313 natives, the largest groups of foreigners numbering as follows: 4,465 British, 3,361 Japanese, 941 Americans, 811 Germans and 330 French. In 1912 the population was estimated to be 651,000.

SHANNON, *shan'un,* the principal river of Ireland and of the United Kingdom, flows 254 miles through a country famous in literature. It rises at the base of Mount Cuilcagh, in County Cavan, and flows in a southwesterly direction through a series of beautiful lakes, or loughs, emptying into the Atlantic Ocean between Loop and Kerry headlands. Its main tributaries are the Fergus, Mulkear, Liffey and Deel, and in County Lanford it is joined by the Royal Canal. Killaloe, Castleconnel, Athlone and Carrick-on-Shannon are favorite places for sportsmen, as the salmon fishing is famous, and in the loughs trout are found. In the last sixty miles of its course the river becomes a tidal estuary, and at Limerick it is thirteen miles wide, making the city the most important port on the west coast. Large ships ascend the stream to Limerick, small ones to Athlone. Light-draft boats, by means of several short canals, can sail upstream to the head of Lough Allen, which is near the source of the river.

SHARK, a group of large, flesh-eating, deep-sea fish, ranked among the most voracious of marine animals. They are found in all parts of the ocean, but are most abundant in warm regions. Their rounded, tapering bodies, which sometimes reach a length of forty feet or more, have no scales, but are covered with rough,



FORM OF THE SHARK

horny skin, commercially called *shagreen.* This is sometimes used in place of sandpaper for polishing wood of fine grain. The mouth, because of the elongated snout, is on the under side of the head, and the animal must turn nearly upon its back when it bites its victim. In some species there are several rows of long, sharp teeth, all but one of which are folded back on the jaws, and as each set wears out, another grows to take its place. Other species have broad, flat teeth, and in a few varieties they are small. The gills of sharks communicate with the surface by several openings, and these are on the sides of the body. The tail is generally unequally notched.

Sharks are rapid swimmers, and frequently follow vessels for days at a time to secure food and waste matter thrown from them. They devour small fish of all kinds and do considerable damage to the food-fish supply. The largest species is the *whale shark,* often over fifty feet long. Next in size is the harmless *basking shark,* found chiefly in the Arctic Ocean and so-called because it is known to bask in the sun on the surface of the water. One of the best-known species is the *white shark,* a man-eater living in tropical seas and sometimes found off the southern coasts of the United States. The *blue shark,* named from its color, also preys on man; it is a gluttonous fish which often follows its prey into the nets of fishermen.

Some of the sharks are called *hammerheads* because the head is shaped like a hammer, with the eyes at either end. Among many other species are the *dusky, porbeagle, spinous, angel* and *dog* sharks.

Shark Fishing. On Lapland and Norwegian coasts, as well as those of China, India and Africa, shark fishing is an important industry, but it has not as yet been developed in the United States. In Norwegian waters sharks are caught about 150 miles from land. Where the fishing boat is stationed a barrel pierced with

holes and filled with oil is sunk; as the latter escapes it attracts the fish, which are caught by chains and hooks baited with salted seal meat. As soon as a monster is hooked it is stunned by a heavy blow on the head.

In some countries sharks' flesh is used as food. Abundant oil is taken from the livers, and in China the fins, from which gelatin and soups are made, are in great demand. M.K.

Consult Dean's *Fishes, Living and Fossil.*

SHARON, *shair'un,* PA., a borough in Mercer County, north of the center near the west state boundary line, seventy-five miles northwest of Pittsburgh. It is on the Shenango River and on the New York Central, the Erie, the Pennsylvania and the Pittsburgh & Lake Erie (freight only) railroads and has electric interurban service. Here is located Hall Institute, a Baptist school. The industrial establishments of the borough include stone quarries, boiler and machine shops, rolling mills, ordnance works and manufactories of explosives, nails, horse collars, stoves, chains and lumber products. There is also considerable trade in coal. Sharon was settled in 1795, and was incorporated as a borough in 1841. The population, which in 1910 was 15,270, had increased to 18,616 (Federal estimate) in 1916.

SHAS'TA, MOUNT. In the northern extremity of the beautiful Sierra Nevada range of California there rises a lofty, snow-covered, conical mountain, which towers to a height of over 10,000 feet above the plains of the Sacramento Valley. This mountain, dominating the whole landscape, is Mount Shasta. (See illustration, in article CALIFORNIA.)

Mount Shasta is a typical volcanic mountain, attaining a height of 14,350 feet above sea level, and is formed of two peaks. The western, 12,900 feet high, known as Crater Peak, or Shastina, has at its top a crater about three-fourths of a mile in diameter and 2,500 feet in depth. Mount Shasta is a remarkable product of the great volcanic activity—traces of which are so abundant in the whole Sierra Nevada range—to which this region was subjected in the remote past. On its northern slope are several glaciers, some of considerable size. A number of these are found at as low an altitude as 9,500 feet, while on other mountains glaciers are seldom at a lower altitude than 11,000 feet.

These glaciers are only the remnants of the numerous large glaciers which in a former geological age covered the summits of these mountains. They have left indelible evidence of their existence in the numerous valleys and amphitheaters with their towering walls and in the thousands of glacial lakes and ponds.

Consult Muir's *Picturesque California* and his *The Mountains of California.*

SHAUGHNESSY, *shaw' ne si,* THOMAS GEORGE, First Baron (1853-), a Canadian railroad executive, president of the Canadian Pacific Railway. Shaughnessy was born at Milwaukee, Wis. As a boy of sixteen he began railroading with the old Milwaukee & Saint Paul Railway and later with the Chicago, Milwaukee & Saint Paul. In 1882 he entered the employ of the Canadian Pacific Railway as general purchasing agent. Later he became in turn assistant general manager, assistant to the president, vice-president and finally, in 1898, president. His prominence in railroad affairs led to his election as officer or director in various industrial and financial corporations. He was knighted in 1901, and in 1916 was raised to the peerage as Baron Shaughnessy of Montreal [Canada] and Ashford [County Limerick, Ireland].

SHAUNAVON, *shaw'na von,* a town in southern Saskatchewan, a division point on the Weyburn-Lethbridge branch of the Canadian Pacific Railway. It is 230 miles west of Weyburn, eighty-four miles east of Altawan, at the Alberta-Saskatchewan boundary, and about 175 miles east of Lethbridge. Shaunavon is the market and distributing point for a wheat-growing and ranching country which is being opened up by the Weyburn-Lethbridge line. It has numerous general stores, lumber yards, grain elevators and a flour mill. The town was founded in 1914. Population in 1916, estimated, 1,200.

SHAW, ALBERT (1857-), the founder and editor of the *American Review of Reviews,* was born at Shandon, Ohio. He was graduated at Iowa College (now Grinnell) in 1879, spent several years as an editorial writer on the Minneapolis *Tribune,* in study abroad, and as professor of international law at Cornell University, before he began editing the *Review of Reviews,* in 1891. Since that time he has proved that as an editor of a current-events magazine he has few equals. He has also an established reputation as a writer on economics and municipal government, and is the author of *Coöperation in the Northwest, Local Government in Illinois, Municipal Government in Great Britain, Municipal Government in Continental Europe, Cartoon History of Roosevelt's Career* and other books.

SHAW, ANNA HOWARD (1847-), an American physician, minister, lecturer and writer, active in many fields, but especially identified with the woman suffrage movement. Though born in England, at Newcastle-on-Tyne, she has resided in America from early childhood, and was educated in that country at Albion (Mich.) College and at the Boston University schools of theology and medicine. She holds a degree of doctor of medicine, and is a regularly ordained minister, having received ordination from the Protestant Methodist Church in 1880. Dr. Shaw was pastor of Methodist Episcopal churches in Massachusetts for a number of years, but the rules of that denomination forbade her receiving ordination to its ministry. From 1886 to 1904 she was national lecturer for the National American Woman's Suffrage Association, and was its president from 1904 until 1915. In the latter year she resigned that she might devote her energies to an active campaign for the enfranchisement of womn.

ANNA HOWARD SHAW

After the entrance of America into the War of the Nations she announced her disapproval of the "heckling" tactics adopted by the militant leaders of the suffrage movement, and gave her loyal support to the government, becoming chairman of the Woman's Advisory Committee of the Council of National Defense. Dr. Shaw has the unique distinction of being the only woman who has preached in the state church of Sweden, the Gustav Vasa Cathedral, and she was the first ordained woman to preach in the various European capitals. Her autobiography, *The Story of a Pioneer,* was published in 1915.

SHAW, GEORGE BERNARD (1856-), a British dramatist, novelist and critic, born at Dublin, Ireland. He attended school in his native city, but his education was not very extensive, for by his fifteenth year he had begun to earn his own living. In 1876 he went with his family to London, where he did office work of various kinds until able to support himself by literary work. Shaw was much interested in socialism and used his talents in every way possible to advance it, speaking on street corners, contributing articles to magazines, and making it the central theme of his novels. There were four of these—*The Irrational Knot, Love Among the Artists, Cashel Byron's Profession* and *An Unsocial Socialist;* they met with only a fairly favorable reception. His dramatic and musical articles for various London journals were more successful, however, and his defense of Ibsen and of Wagner in *The Quintessence of Ibsenism* and *The Perfect Wagnerite* attracted wide attention.

GEORGE BERNARD SHAW

Shaw's first play, *Widowers' Houses,* was produced in 1892. It was followed by a series of plays, including *Mrs. Warren's Profession, The Philanderer, Arms and the Man, You Never Can Tell, Candida, The Devil's Disciple, Caesar and Cleopatra, The Shewing-up of Blanco Posnet* and *Fanny's First Play,* which have perhaps aroused more discussion than those of any other author. Shaw is always clever and usually satirical, and his satire on the shams and hypocrisies of society is often stinging. Nevertheless, he is so fond of paradox that he is often taken for a mere humorist rather than a satirist.

Consult Henderson's *Shaw: His Life and Work;* Howe's *George Bernard Shaw.*

SHAW, HENRY WHEELER (1818-1885), an American humorist, more familiarly known by his pen name JOSH BILLINGS, was born at Lanesborough, Mass. He attended Hamilton College for a year, but left school to go West, where he engaged in various occupations for twenty-five years. Returning in 1858 to Poughkeepsie, N. Y., he became an auctioneer, and wrote several humorous articles for newspapers in that city, but for some time received little attention as a writer. When, however, he began to use his queer, "backwoods" diction, spelling words to sound just as he pronounced them, his articles became immensely popular. For many years the *New York Weekly* published Shaw's contributions, and in 1863 he went on the public platform, where, with his

droll sayings and quaint moral lectures, he was very successful. In 1866 his first book, *Sayings of "Josh Billings,"* was published, and had a sale of many thousand copies. This was followed by *Every Boddy's Friend* (1876), *Josh Billings' Trump Kards* (1877), *Josh Billings' Spice Box* (1881) and others along that line, and he also published yearly *Josh Billings' Farmers' Allminax.*

SHAWENEGAN, *shaw'en e gan,* **FALLS,** a town in Saint Maurice County, Quebec, noted for the near-by falls of the Saint Maurice River and for the aluminum and manganese manufactured there. Shawenegan Falls is on the west bank of the Saint Maurice River, and on the Canadian Pacific and Canadian Northern railways. By rail it is twenty-one miles northwest of Three Rivers, 116 miles northeast of Montreal and ninety-eight miles southwest of Quebec. The falls of the Saint Maurice are 165 feet high and are capable of developing 200,000 horse power. In addition to aluminum and manganese, the town's chief products are paper, wood pulp and carbide. Population in 1911, 4,265; in 1916, estimated, 5,000.

SHAWNEE, *shaw ne',* an Indian tribe of the Algonquian family. The Shawnee were first known to white men about 1670, when they were living along the Savannah River in South Carolina. Later they spread out into Tennessee, Kentucky, Pennsylvania and Ohio. They were a strong, warlike tribe, superior in intellect, and very courageous. Tecumseh, their most celebrated chief, fiercely opposed the advance of white settlers upon Indian soil and harassed them continually. In 1812 he led the Shawnee against the Americans, but his death dispirited his people, and their later history is a record of treaties and movements westward. The remnant of the tribe, numbering about 1,400 persons, lives in Oklahoma. See TECUMSEH.

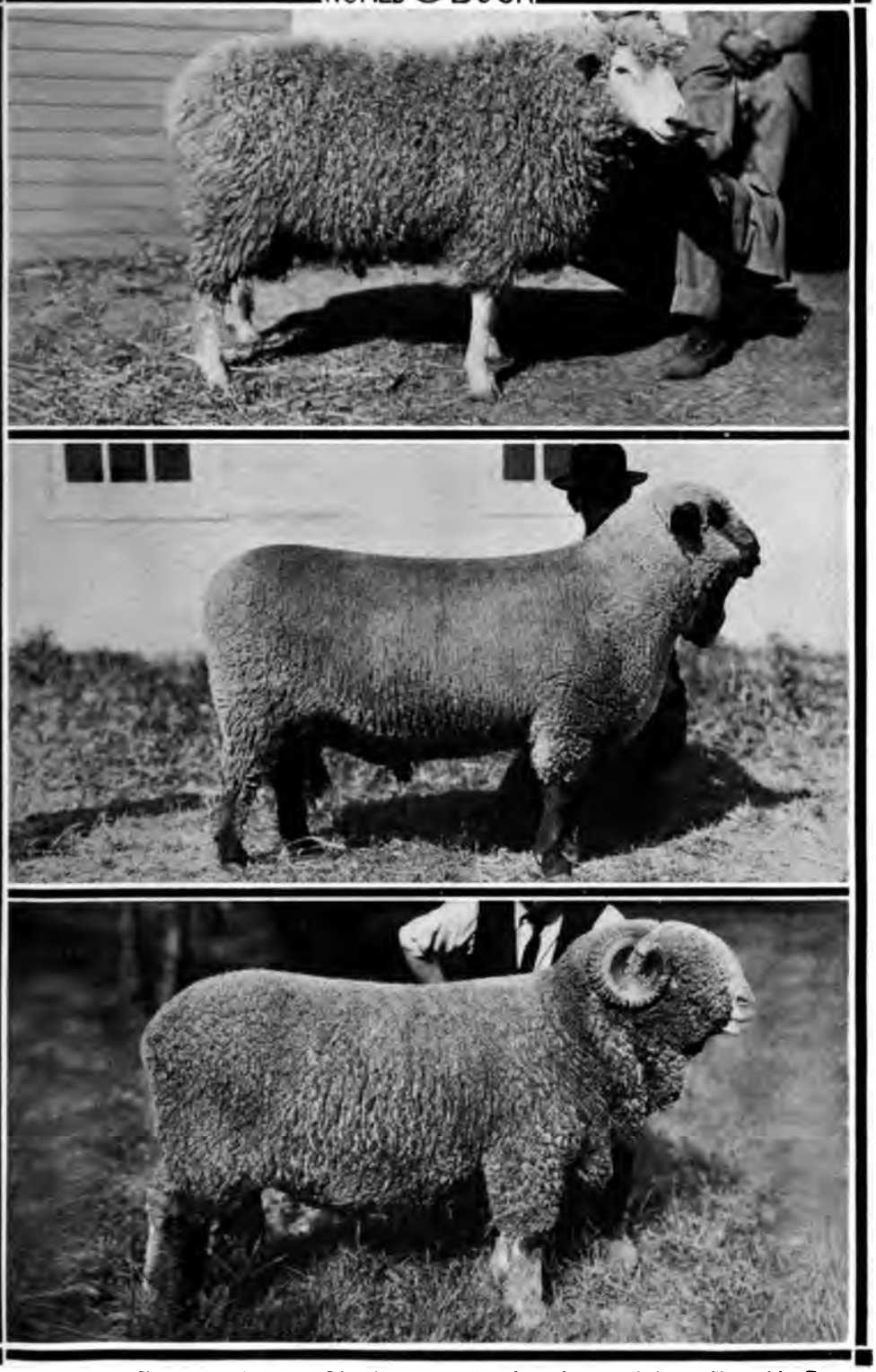
SHAWNEE, OKLA., a city in Pottawatomie County, centrally located in the state, thirty-seven miles southeast of Oklahoma City and 448 miles west of Memphis, Tenn. It is on the North Canadian River, and on the Atchison, Topeka & Santa Fe, the Chicago, Rock Island & Pacific, both of which have shops here, and the Missouri, Kansas & Texas railroads. The population, which was 12,474 in 1910, had increased to 18,138 (Federal estimate) in 1916. The area of the city is more than two square miles.

The principal features of Shawnee are the Baptist and Catholic universities, the city hall, a convention hall, a $125,000 high school, Carnegie Library, city hospital and several attractive parks. In the surrounding agricultural country corn, alfalfa and cotton are the leading crops. Oil has been discovered in paying quantities near the city. Besides its railroad shops, Shawnee has cotton gins, a milling company doing an annual business worth $2,000,000, and a garment factory whose annual production is valued at $300,000. The place was settled in 1895 and the next year became a city.

SHAYS' REBELLION, an uprising in 1786-1787 in Western Massachusetts, based upon the discontent over financial conditions at the close of the Revolutionary War. Excessive salaries of office holders, abuses in the administration and the exorbitant land taxation were the principal grievances. About 600 insurgents, under Daniel Shays, gathered at Springfield in September, 1786, and intimidated the supreme court, which adjourned after three days. Disturbances continued, and on January 25, 1787, Shays led an army of 2,000 men against the Federal arsenal at Springfield. The state militia soon overwhelmed them, and by the end of February the revolt was quelled. Fourteen of the ringleaders were sentenced to death, but they were later pardoned by the governor of Massachusetts, John Hancock.

SHEBOY'GAN, WIS., an important shipping point and industrial center, and the county seat of Sheboygan County, is situated on Lake Michigan, at the point where it receives the waters of Sheboygan River. Manitowoc is twenty-eight miles north, Milwaukee is fifty-two miles south, and Chicago is eighty-four miles farther south. Steamers communicate with the principal lake ports and there is regular service between Chicago, Milwaukee and Sheboygan. The Chicago & North Western Railway provides inland transportation and an electric line extends to Elkhart Lake, a summer resort in the vicinity. Sheboygan was settled in 1835, was incorporated as a village in 1846 and as a city in 1853. Germans comprise the greater part of the population, which had increased from 26,398 in 1910 to 28,559 (Federal estimate) by 1916. The area of the city is nearly five square miles.

Sheboygan is the commercial center for a large agricultural and dairying region. There are coal and salt docks, and several big warehouses, five of them being for cheese alone. The city is noted for its extensive manufacture of chairs, about 2,000 people being employed in the five factories. Tanneries, enameling



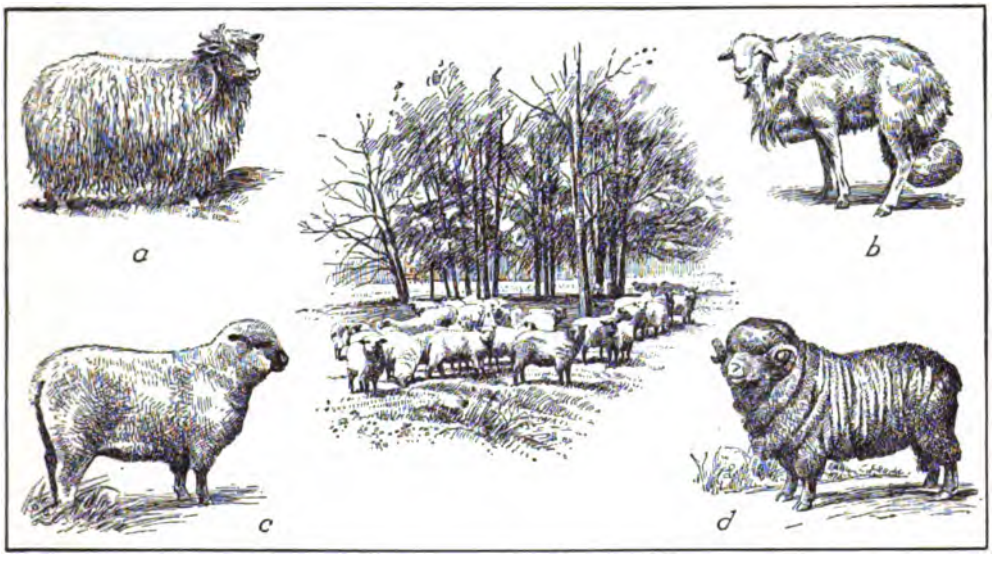
SHEEP. From top to bottom: Lincoln ram, mutton sheep, long wool class. Shropshire Down ram, mutton sheep, medium wool class. Rambouillet ram, class "C" type of Merino.

plants, toy and broom factories, machine shops, breweries and furniture factories are included among a great variety of other establishments. The state fish hatchery is at Sheboygan. Noteworthy buildings are the post office, the new city hall, courthouse, Holy Name Church, Saint Clement's Church, which cost $85,000, the county insane asylum, Saint Nicholas Hospital and a home for the friendless. In addition to the public and parochial schools there are a business college and a Carnegie Library. The city has a fine beach and three parks, one of which, Fountain Park, contains a mineral salt well.

SHEEP. Sheep are among the most useful of domestic animals. Their wool is made into clothing, their flesh and milk are used for food, and from their skin leather is made. The sheep is a cud-chewing animal, and is closely related to the goat and the ox. It was one of the first animals to be domesticated. The Bible contains many references to sheep and shepherds; since the days of the Hebrew nation the lamb has been regarded as the emblem of innocence.

Probably all wild sheep had horns, but these have now disappeared from the ewes of all but the horned Dorset breed, and from rams in most breeds. The horns are hollow like those of the ox, and on the rams they curve in the form of a spiral. Wild sheep are still found in the mountain regions of Asia, Europe and America. The Bighorn of the Rocky Mountains is the best known wild species. This sheep has been nearly exterminated by hunters, but it now finds safety in the game preserves of the United States and Canada, and its numbers are slowly increasing.

Australia, New Zealand, the Union of South Africa, Argentina, Uruguay, Russia, the United Kingdom, France, Spain, India and the United States are the chief wool-growing countries of the world. In the United States, Montana, Wyoming, New Mexico and Ohio are the leading states. There are about 50,000,000 sheep in the United States, and about 9,000,000 are slaughtered annually for their meat. The yearly production of wool is about 290,000,000 pounds. The number of sheep in Canada exceeds 2,000,000. Those raised in the United States and Canada belong to breeds imported originally from Europe.



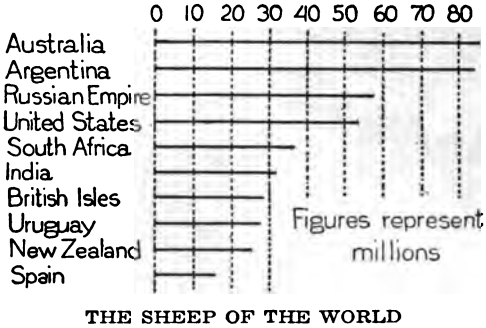
VARIETIES OF SHEEP
(*a*) Lincoln ram; (*b*) fat-tailed sheep; (*c*) Shropshire ram; (*d*) Merino ram.

Domestic Breeds. All breeds can be classified under two general types—the mutton type and the wool type. Those of the mutton type have large bodies and wool of a coarse or medium grade. The following are the most valuable mutton-type breeds:

The *Southdown*, which was named from the South Downs in England, is characterized by a compact body of medium size, wool of a medium grade of fineness and brownish-gray face and legs. The Southdown is the best general-purpose sheep raised in America, where it is

very popular. The *Hampshire* is somewhat larger than the Southdown, and the face and legs are darker, in some instances being almost black. The *Shropshire* also resembles the Southdown, but the body is larger and the wool longer. The *Cotswold* is noted for its long, coarse wool. The size is about the same as that of the Southdown, and the face and legs are white. Two other large white-faced breeds are the *Leicester* and the *Lincoln,* but these are not common in the United States.

All breeds of the wool type have sprung from the Spanish *Merino.* These breeds are characterized by small bodies, with large folds of skin or wrinkles about the neck and shoulders. The wool is short, fine and compact, contains a large percentage of oil and covers the face and legs. These sheep will not thrive on lowlands nor in a damp climate, but they are raised in large numbers in the arid grazing regions of the Canadian Northwest, and in Montana, Wyoming and New Mexico. The original Merino has been modified by cross breeding until a somewhat larger and more hardy animal has been produced. The Merino

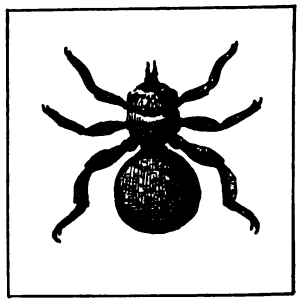


THE SHEEP OF THE WORLD
The ten countries showing greatest production.

is also raised in large numbers in Australia, New Zealand and Argentina. The *Rambouillet,* imported from France, is larger than the Merino and is becoming very popular among American sheep growers.

Diseases. Sheep are subject to many diseases, but scabies, or scab, is by far the most prevalent and the most destructive. The disease is caused by a mite which lives next the skin on those parts of the body where the wool is thickest. The mites bore through the skin and cause the scab. The disease is highly contagious, since the mites crawl from one animal to another. The remedy consists in dipping the sheep in a bath prepared by using one pound of tobacco and one pound of sulphur to six gallons of water, and allowing the mixture to stand for several hours before using. Scab has become so prevalent that the United States government has enacted stringent laws for its treatment and prevention. Other common diseases are grub in the head, caused by a fly, and lip and leg ulceration.

Sheep Ticks. The sheep tick is a wingless fly which lives on the bodies of the animals, obtaining its nourishment by boring through the skin and sucking the blood. The wound causes a slight swelling which itches and burns worse than a mosquito bite. Sheep infested with ticks do not thrive, and the loss caused by them is loss in the production of flesh and wool, since the animal seldom dies. The sheep-grower destroys ticks by dipping the sheep in the same solution as is used for the scab. The tick has a short body, flattened above and below, a tough brown skin and six legs, each provided with two sharp claws. The mouth is a tube armed at the end with teeth, which are used in piercing the skin.



SHEEP TICK

W.F.R.

Consult Shaw's *Management and Feeding of Sheep;* Wing's *Sheep Farming in America;* Clarke's *Modern Sheep: Breeds and Management.*

Related Subjects. The reader is referred to the following articles in these volumes:

Bighorn
Mange
Meat and Meat Packing
Mutton
Wool

SHEEP LAUREL, *law'rel.* See KALMIA.

SHEFFIELD, *shef'eeld,* a city in Yorkshire, England, 165 miles northwest of London, celebrated for 200 years as the manufacturing center of the world's finest cutlery. To-day other parts of the world equal it. The city is pleasantly situated on wooded slopes surrounding the point where the River Sheaf meets the Don, and is a progressive, well built municipality of over 450,000 inhabitants. The working people are excellently provided for in Sheffield, with its public baths, free libraries, parks and technical schools. The city owns and operates its tramways, electric lighting plant and markets, and has numerous churches and trade and art schools, and a university founded in 1905. Among its interesting buildings are the

parish church, dating from the reign of Henry I, the town hall, Saint George's Museum (founded by Ruskin) and Albert Hall, with a seating capacity of 3,000. The fine botanical gardens are visited by all tourists. Besides the thriving cutlery establishments, the city has factories producing bicycles, boilers, stoves, railway springs, ties and rails and other commodities. In an old castle of Sheffield, demolished in 1644, Mary Queen of Scots spent twelve years as a prisoner. The place was chartered by Edward I and was constituted a city in 1893.

SHEIK, *sheek,* an Arabic title, used very loosely, but always meaning a venerable, aged man or a chieftain. It may be the term applied to the head man of a village, the chief of a tribe, the leader of a religious order, or simply a person who is old and highly respected; its use down to this day is restricted, as it was centuries ago, to the Arabs and to their religion, Mohammedanism. The power of a sheik depends wholly upon the character and influence of the individual to whom the title is given. The most powerful sheik is the so-called *grand mufti,* the head of the Mohammedan Church in the Turkish Empire, located at Constantinople.

SHEKEL, *shek''l.* This word, so frequently used in the Bible, meant most anciently a unit of weight, though later it referred as well to a coin. As a weight it was first employed in Babylonia, but its use spread to the Phoenicians and the Hebrews, each of whom, however, modified its value. The Hebrew shekel, to which references are most common, weighed 14.1 grams, or 218 grains. Intrinsically, the gold Hebrew shekel was worth about $10, the silver between sixty and seventy-five cents, though of course the purchasing power was far in advance of such sums to-day. For even while it was but a unit of weight, long before any Hebrew coins were minted, the shekel was used as a medium of exchange, uncoined ingots of gold or silver of known weight being employed.

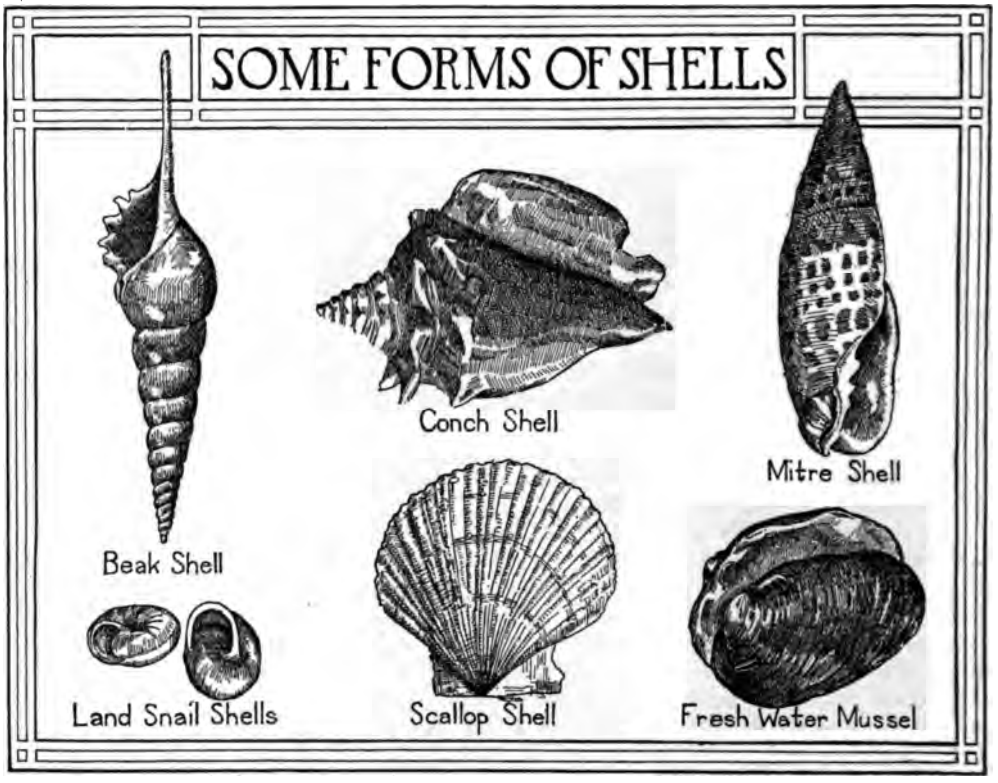
In the time of Simon Maccabaeus the Jews first issued coins of their own, and it is probable that the first ones were struck between 141 and 134 B.C. This is by no means certain, however, as these early Jewish coins bear no date. The most important of these coins was the silver shekel, which weighed between 212 and 220 grains and was of about the diameter of a United States cent. Upon one side was the representation of a chalice, probably a pot of manna, with the words *Shekel of Israel;* while on the other was the legend *Jerusalem the Holy,* surrounding a flower device, presumably Aaron's rod that budded. Half shekels were also coined.

In loose language of the present day the term *shekel* has come to refer to money in general.

SHELBYVILLE, *shel'bi vil,* IND., the county seat of Shelby County, and a center of furniture manufacturing, situated twenty-six miles southeast of Indianapolis and eighty-six miles northwest of Cincinnati, at the junction of the Big Blue and Little Blue rivers. It is served by the Cleveland, Cincinnati, Chicago & Saint Louis and the Pittsburgh, Cincinnati, Chicago & Saint Louis railroads and by electric interurban lines. In 1910 the population was 9,500; it was 10,965 (Federal estimate) in 1916. The area is nearly two square miles. Shelbyville has a county courthouse, a city hall, Carnegie Library, the Major Memorial Hospital and a Masonic Temple. Furniture is made by sixteen factories. Other plants produce flour, brick, carriages, glue, baking powder, mirror screen for picture shows and other commodities. Shelbyville was settled in 1822. It was the birthplace and home of the novelist Charles Major, author of *When Knighthood Was in Flower.*

SHEL'DON, CHARLES MONROE (1857-), an American clergyman and author. He was born at Wellsville, N. Y., educated at Brown University and Andover Theological Seminary, and in 1886 ordained in the Congregational ministry. From 1886 to 1888 he preached at Waterbury, Vt., and from 1889 to 1912 at Topeka, Kan., but in the latter year resigned his pastorate to take part in an antisaloon campaign in New Zealand. In 1900 his name came prominently before the public when for one week he edited the Topeka *Daily Capital* on what he felt were strictly Christian principles. Sheldon's works, some of which have been very popular, include *Robert Hardy's Seven Days; The Crucifixion of Philip Strong; His Brother's Keeper; In His Steps,* by far the best known and most widely discussed; *The Miracle at Markham; Who Killed Joe's Baby?* and *The Narrow Gate.* He has also edited various works of a religious character. There is the spirit of the crusader in nearly everything he has written; he uses a book to drive home to the reader a great spiritual or moral principle.

SHELL, the hard covering of the bodies of mollusks and of various other groups among the lower animals. The mollusks are the typ-



ical shell builders, and no other animal group is so widely distributed. Their shells are found not only along the ocean borders and in the sands of the lake shores, but in low inland plains, in swamps and even on high mountains. These animals build their shells not as bees make combs of wax; the fleshy covering of the body, or mantle, secretes lime from the water, and layer by layer the limy substance is added to the growing shell. The latter is protected from the corrosive action of acids in the water by a horny, outer skin and a pearly lining. The shells of mollusks are divided into two classes —the *univalve,* or those of one piece, and the *bivalve,* those consisting of two parts joined by a hinge.

Of the first class, the graceful spiral or wheel-like shells of the snails are most common, some being delicate, lustrous and pearly, others, heavy, thick and dull. The single-piece shells include also the rose-lipped covering of the conch, a mollusk abundant on the Florida coast; the cowrie shells which the child holds to his ear to hear the sound of the sea; the long, spindle shells of the warm waters of the Pacific and the California shores; the handsome trumpet shells and giant whelks of the Atlantic; the tiny rice shells and the helmet and cone shells of Southern United States. The chambered nautilus of the deep seas, which each year adds to its spiral shell a new chamber for which it forsakes the old one, is another interesting univalve mollusk.

Clam and oyster shells are the most common bivalve shells, and the latter are also of great commercial importance because of their inner layer of pearl, called mother-of-pearl.

Uses of Shells. Buttons, buckles, knife handles and many other articles are made from the pearly lining of the oyster shell, and a large amount of white pearl is also obtained from the fresh-water mussels of the Mississippi River, especially between Quincy, Ill., and Prairie du Chien, Wis., and in the adjacent waters. Over six billions of pearl buttons are annually manufactured in the United States. Mother-of-pearl is also extensively used for inlaying fancy boxes, musical instruments, furniture and wall panels, and as a covering for opera glasses, card cases, etc.

The beautiful greenish and rosy-hued abalone shell, found in the California coast waters, is combined with the white pearl in inlay work and is also mounted in silver for jewelry or

carved into cameos, and the large shells are used as ornaments. They can be seen from the glass-bottomed boats near Catalina Island, where about $40,000 worth are annually sold.

Pulverized conch shells are used in the manufacture of porcelain, and many of the large and beautiful varieties are prized as ornaments. A flat, thin shell found in the Pacific and Indian oceans, so transparent that print can be read through it, is commonly used in the Philippine Islands as a substitute for window glass. In Africa and India, the small cowries furnish a ready-made currency requiring only to be strung. They are the only currency of the natives of the Sudan in Africa, and traffic in these shells on the west coast of Africa has made fortunes for the Dutch and English traders, who exchange them for palm oil and ivory. A scallop shell worn by the pilgrims of the Middle Ages, to show they had crossed the sea to the Holy Land, came to be known as *pilgrim shell*. These shells were frequently adopted as heraldic devices by families whose ancestors had made the pilgrimage. E.B.P.

Related Subjects. For further information on the subject of shells the reader is referred to the following articles, many of which are illustrated:

Abalone	Mollusks
Cameo	Mussel
Clam	Nautilus
Conch	Oyster
Cowrie	Scallop
Mother-of-pearl	Snail

SHELL, a term used collectively to describe the various projectiles fired from big guns. There are many different forms of shell, varying in shape, size and composition, according to the purposes for which they are intended. Ordinarily, a shell is a hollow projectile filled with explosive powder, or powder and bullets, which scatter when the charge is exploded by a fuse set for this purpose. Shells are now usually made of steel or copper.

The shells used by armies on land are quite different from those used in naval warfare. On land it is seldom that the shell is required to penetrate any metal defenses, except when permanent forts are attacked, so the metal of which they are composed does not go through the hardening processes necessary for shells intended to pierce the armor plate of vessels.

In the War of the Nations, beginning in 1914, the shell chiefly used was shrapnel, except when the biggest guns were battering down forts by sheer weight of metal. The smallest shrapnel shell is that used in field guns, which in the French, German and British armies are guns of approximately 3-inch caliber. The weight of the shell varies according as it is a high- or a low-velocity shell. A gun will send a light shell a great distance at high velocity, and it will send a heavier one perhaps as far but not as quickly. The French and German high-velocity shells weigh sixteen pounds. The British usually fire from the 3-inch gun a shell of eighteen and one-half pounds weight for field artillery and thirteen pounds for horse artillery. The shell contains from 250 to 363 bullets, which are discharged by the bursting of the shell. The charge for firing a shell of sixteen pounds is 4.61 pounds of explosive containing forty per cent nitroglycerine (these figures referring to one of the latest Krupp guns). The following table illustrates the weight of shell and weight of charge fired from six patterns of Krupp ordnance:

CALIBER: INCHES	WEIGHT OF GUN: TONS	WEIGHT OF CHARGE: POUNDS	WEIGHT OF PROJECTILE: POUNDS	RATE OF FIRING	PERFORATION (WROUGHT IRON)
12.1	52.0	357.0	981.0	2-3 per minute	53.1 inches
9.45	25.45	173.6	474.0	3-4 " "	42.0 "
7.48	12.64	86.2	235.9	5-6 " "	33.1 "
5.91	6.1	41.7	112.4	6-8 " "	26.1 "
4.13	2.13	14.55	39.7	20-25 " "	18.3 "
3.54	1.45	7.94	25.13	25-30 " "	15.6 "

The following table shows the same particulars concerning ordnance in use by the United States navy:

CALIBER: INCHES	WEIGHT OF GUN: TONS	WEIGHT OF CHARGE: POUNDS	WEIGHT OF PROJECTILE: POUNDS	RATE OF FIRING PER MINUTE*	PERFORATION (WROUGHT IRON)
13	61.4	480	1,130	.....	31.8 inches
12	56.1	340	870	.....	52.0 "
10	34.6	207.5	510	.....	38.0 "
6	8.6	37.0	105	.....	23.5 "
4	2.9	12.3	33	.....	11.0 "

*Figures as to rapidity of fire are not available, but it may be assumed that the rate of fire is at least equal to that of European guns of the same caliber.

Siege Gun Projectiles. For siege guns, intended to batter down forts and permanent positions, great weight of metal is needed, and as has been proved by the effect of the big German siege guns, the shells fired have been brought to such perfection that no armor plate can resist their destructive effects.

The 4.7 siege guns of the United States army, called the 60-pounder, hurls a shell of sixty pounds weight a distance of 7,500 yards (over four miles) with great effect. The charge is 5.94 pounds of smokeless powder. The British 6-inch howitzer fires a shell weighing 122 pounds and has an effective range of 7,000 yards. From the commencement of the War of the Nations in 1914 it has been apparent that heavy siege artillery must undergo great improvements to compete with the huge guns just completed, to the surprise of the world, by the Krupps, the great German manufacturers of ordnance. Ranges of 11,000 and 12,000 yards (at least seven miles) and even more have been obtained, and shells at that range have wrought terrible havoc, a thing unheard of on land before the outbreak of the last war. Naval guns of largest caliber project shells with deadly effect from ten to eleven miles. F.ST.A.

References: Any book published prior to 1914 is worthless as a record of improvement in the manufacture of ammunition. The War of the Nations changed every standard of warfare.

The reader is referred to the following articles in these volumes:

Ammunition	Projectile
Navy	Shrapnel

SHELLEY, *shel'i,* PERCY BYSSHE (1792-1822), an English poet of the Romantic Age of English literature. He was born at Field Place, near Horsham, Sussex, of a family recently raised to a baronetcy. In his school life from his earliest years he displayed a hatred of oppression of all kinds which clearly indicated the tendencies most noticeable in his later life. In 1810 he entered Oxford, where he soon gave evidence of his literary gifts, but his publication of a pamphlet on *The Necessity of Atheism* caused his expulsion from the university. This event was a keen disappointment to his family, and led to the cutting off of his allowance. For a time, then, Shelley lived in London, supported by what his sisters could save from their allowances, but at length his father relented so far as to give him $1,000 a year.

His Two Marriages. Shelley's elopement with Harriet Westbrook, a pretty school friend of his sisters and a daughter of a former tavern keeper, again turned his family against him, and he was forced to make his own way. After two years spent in traveling through England and Ireland, he became estranged from his wife, and soon afterward visited the continent with Mary Godwin. Two years later his wife committed suicide by drowning, and Shelley, whether from remorse or from grief alone, suffered keenly. He married Mary Godwin, however, and with her and their children went to Italy. Of the children of his first marriage he had been deprived because of his atheism. In Italy Shelley was associated with Byron and with Leigh Hunt, and there he produced some of his best work. In June, 1822, he went with a friend for a sail on the Mediterranean, but the boat was overtaken by a storm and both Shelley and his companion were drowned. The bodies were recovered and cremated, and the ashes were buried in the Protestant cemetery at Rome.

SHELLEY

He was one of the most ardent, independent and reckless English poets inspired by the French Revolution; a man who could face infamy and defy the conventionalities of the world. Shelley failed to adjust himself to the customs and laws of his actual surroundings. He was calumniated and despised by the public at large, and almost idolized by his intimate friends. —HALLECK.

His Ideals. From his early youth Shelley had to endure persecution because of his extremely revolutionary tendencies and his independence of spirit. He longed to establish an ideal state of society, based upon the principle of universal brotherhood and having as its object the development of individuality rather than the upholding of institutions. Naturally, he lived in continual rebellion against existing conditions—was what Matthew Arnold called "a beautiful and ineffectual angel, beating in the void his luminous wings in vain."

In *Queen Mab, The Revolt of Islam* and *Prometheus Unbound,* his theme is the complete liberation of the world. His views, however, were not clearly defined, nor had he any idea of practicable methods. The poems which most completely set forth his ideals and aspirations seem to the average reader enveloped in mystery. Most obscure of all his poems are *The Witch of Atlas* and *Epipsychidion.* There

is a quality of his verse, however, which all can appreciate—its music and its delicate, ethereal beauty. This is especially to be found in such lyrics as the *Ode to the West Wind, The Cloud, The Ode to a Skylark* and *Lines to an Indian Air,* and in the elegy *Adonais,* written on the death of Keats. In his poetry the most charming personifications abound, for to him nature always appeared as the symbol of his own moods and emotions. All in all, Shelley ranks as one of the first of English lyric poets; perhaps when at his best no one has ever surpassed him. A.MC C.

Consult Clutton-Brock's *Shelley, the Man and the Poet;* Angell's *Shelley and His Friends in Italy.*

SHEM, the eldest son of Noah and traditional ancestor of the Semitic peoples (see SEMITES). Shem and his brother Japheth showed a respectful attitude toward their father (*Genesis* IX, 20-23), in contrast to the irreverence of Ham, and Noah accordingly prophesied that the descendants of Shem would subdue the Canaanites, or descendants of Ham, and that the Canaanites would serve both them and the descendants of Japheth. Japheth would also benefit by the achievements of the Semites. The fulfilment of this prophecy is the subject of much interesting research and discussion, some believing it to be of merely local and others of world-wide application.

SHENANDO'AH, PA., a borough in Schuylkill County, in the east-central part of the state, 105 miles northwest of Philadelphia. It is served by the Pennsylvania, the Lehigh Valley and the Philadelphia & Reading railroads and by electric interurban lines. Within the city and in the immediate neighborhood are a number of rich anthracite coal mines. The mining and shipping of coal is the leading industry, and there are in the place machine shops, foundries and mining-tool works. Shenandoah was settled in 1850 and was incorporated as a borough in 1866. It has good schools and churches and a public library. In 1910 the population was 25,774; it had increased to 29,201 (Federal estimate) in 1916. The area is one and one-half square miles.

SHENANDOAH RIVER, a river of Virginia which flows in a northeasterly direction for 170 miles through a beautiful valley formed by the Blue Ridge and the central Appalachian mountains. At Harper's Ferry it unites with the Potomac. The river furnishes a great amount of water power, but is navigable only by small steamers for about 100 miles. The Shenandoah Valley was an important battle field during the War of Secession. "Stonewall" Jackson's 1862 campaign there won him fame, and Sheridan made his historic ride of twenty miles from Cedar Creek to Winchester in the valley, reorganizing his troops and returning to defeat Early. See SHERIDAN, PHILIP HENRY.

SHEP'ARD, HELEN GOULD, eldest daughter of Jay Gould. See GOULD (family).

SHEPHERD, *shep'erd,* **DOG,** the general name of a group of dogs used to guard flocks of sheep. They are usually large and strong, but the group includes also the small Spitz, or Pomeranian. Of all the shepherd dogs the finest breed is the Scotch collie, described in these volumes under the heading COLLIE.

SHER'ATON, THOMAS. See FURNITURE, subhead *English Development.*

SHERBROOKE, *shur'brook,* a city in Quebec, the county town of Sherbrooke County, and one of the leading manufacturing centers of the province. It is in the southern part of Quebec, about forty miles north of the Vermont boundary, at the junction of the Magog and Saint Francis rivers, and on the Grand Trunk, Canadian Pacific, Boston & Maine and Quebec Central railways. It is 101 miles by rail southeast of Montreal, 122 miles south of Quebec and 196 miles northwest of Portland, Me. Population in 1911, 16,405; in 1916, estimated, 20,000.

Sherbrooke derives abundant water power from the two streams at whose junction it is situated. Among its manufactures are mining and other machinery; woolen, silk and cotton goods of all kinds, including carpets and clothing; cigars, and, during the War of the Nations, shells. Sherbrooke has two public hospitals, a public library, a fine post office, and a courthouse which cost $60,000 to build. The water works and the gas and electric light systems are owned and operated by the city.

Sherbrooke was named for Sir John Sherbrooke (1764-1830), a British general who fought under Wellington in Spain and in 1811 was appointed lieutenant-governor of Nova Scotia. From 1816 to 1818 he was Governor-General of British North America.

SHER'IDAN, PHILIP HENRY (1831-1888), a Union officer in the War of Secession, distinguished for his high courage and brilliant qualities of leadership. His military career was practically an unbroken series of victories, and he was one of the three Union officers in that war who attained the rank of general, the others being Grant and Sherman. Sheridan was born

in Albany, N. Y. He was graduated at West Point in 1853, and before the outbreak of the war between the states learned something of actual fighting in wars with the Indians. A lieutenant at the outbreak of the war, he won rapid promotion, attaining the rank of brigadier-general of volunteers in July, 1862, and of major-general the following December. Meantime he had given an excellent account of himself at Booneville, Perryville and Murfreesboro. In 1863 his division fought so gallantly at the Battle of Chattanooga that Grant, who was seeking an "active and energetic man, full of spirit and vigor and life," made him commander of the cavalry of the Army of the Potomac.

GENERAL PHILIP SHERIDAN

Sheridan took up his new command in April, 1864, and rendered valuable service throughout the summer by protecting the flanks of Grant's army and harassing his opponents. His best opportunity for brilliant service came in August, however, when he was given charge of the Army of the Shenandoah. His defeats of Early at Opequon Creek, Fisher's Hill and Cedar Creek, in the Shenandoah Valley, and his ruthless devastation of that fertile region must be counted among the blows against the Confederacy that hastened its fall. When the Battle of Cedar Creek was begun Sheridan was at Winchester, twenty miles away. Hearing the sounds of fighting, he galloped toward the scene of battle and turned defeat into brilliant victory. This now famous ride is the theme of a well-known poem by Thomas Buchanan Read, which contains these lines:

With foam and with dust the black charger was gray,
By the flash of his eye, and his nostril's play
He seemed to the whole great army to say,
"I have brought you Sheridan all the way
From Winchester, down to save the day!"

These exploits in the Shenandoah brought Sheridan the rank of major-general in the regular army, in November, 1864. During the remainder of the war he was one of Grant's most efficient aids, and was present when Lee surrendered at Appomattox.

After the war Sheridan commanded in turn the Department of the Gulf, the Fifth Military District in Louisiana and Texas and the Department of the Missouri. When Sherman succeeded Grant as general, in 1869, Sheridan became lieutenant-general, and on Sherman's retirement in 1884 Sheridan was appointed commanding general of the United States army. In 1870 he went to Europe to study operations in the Franco-German War. His *Personal Memoirs* were published in 1888. B.M.W.

SHERIDAN, Richard Brinsley Butler (1751-1816), a British dramatist whose fame rests chiefly on two comedies, *The Rivals* and *The School for Scandal.* Both are classics of English drama, ranking among the best comedies produced in England since the time of Shakespeare. Sheridan was born in Dublin, Ireland. Though he studied law his fondness for writing caused him to take up literature as a means of livelihood, and in 1775 *The Rivals* was successfully produced in London. In the same year his comic opera *The Duenna* was staged. This played for seventy-five nights, a sensational "run" in those days. Sheridan soon after purchased the Drury Lane Theater and managed it until 1809, when it was burned. This disaster cut off the greater part of his income, and during the rest of his life he was in serious financial difficulties. At one time his friends had to raise money to obtain his release from a debtor's prison.

Sheridan was very popular among the literary men of his time, because of his wit and charming personality, and he belonged to Dr. Johnson's famous Literary Club. Besides the comedies mentioned, his principal works are a farce called *Saint Patrick's Day* and a comedy entitled *The Critic.* He also won a name as an orator during a Parliamentary career of twelve years, especially for his speeches against Warren Hastings.

Consult Bettany's *Sheridan and His Circle.*

SHERIDAN, Wyo., the county seat of Sheridan County and an important live stock center, is centrally located in the state near the northern boundary, and on the Chicago, Burlington & Quincy Railroad. Prominent buildings are the state hospital, city hall, courthouse and Carnegie Library. Sheridan is the shipping point for an extensive agricultural and stock-growing country, in which there is also some coal mining. Fish and game are abundant in this section of the state. Sheridan was settled in 1882, and was incorporated the fol-

lowing year. Several memorable battles were fought in this locality at the time of General Sheridan's campaign against the Sioux confederacy in 1876. The population in 1910 was 8,408; it was 12,713 (Federal estimate) in 1916. The area is more than two square miles.

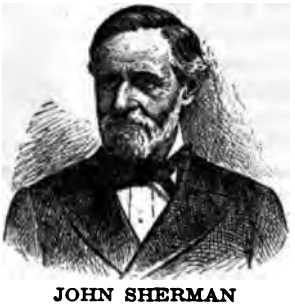
SHERIFF, *sher'if,* in the United States and Canada a county officer empowered to execute civil and criminal process throughout the county. Specifically, he is charged with the safe keeping of prisoners and juries, and with the prevention of breaches of the peace. He attends courts as chief administrative officer and executes their judgments. When a warrant of attachment is issued it is his duty to seize the property attached. If judgment is rendered against a debtor the sheriff is the officer empowered to seize his property and to sell it to satisfy claims of creditors. He may perform these duties in person or through an authorized deputy sheriff.

In the United States the sheriff must be twenty-one years of age, be a citizen of the country, and reside in the county which he represents. In most states the office is elective, and in some he may serve but two successive terms. The name is derived from the Anglo-Saxon word for *shire reeve,* the shire being a political division in old England corresponding to a modern county. The headman of the shire was called *reeve.*

In Canada. Every county or judicial district in a province is represented by a sheriff, who is appointed by the provincial lieutenant-governor in council. The sheriffs in Canadian provinces carry out the orders, sentences and judgments of superior courts. They summon juries, and have charge of jails and their keepers. Each sheriff appoints his own deputies and is responsible for their behavior as officials, and he must give security for the performance of his own duties.

SHERMAN, JAMES SCHOOLCRAFT (1855-1912), an American Congressman and Vice-President, born at Utica, N. Y. He was graduated at Hamilton College in 1878, was admitted to the bar in 1880, and began practice in his native city. Not long after he became prominent in Republican politics. In 1884 he was elected mayor of Utica, and in 1887 he became a member of Congress, serving until 1909, excepting for the term of 1891-1893. He was elected Vice-President on the Republican ticket in 1908, and was renominated with Mr. Taft in 1912, but he died six days after the election in November. His place on the ticket, as voted by the Electoral College the next January, was filled by Nicholas Murray Butler, president of Columbia University.

SHERMAN, JOHN (1823-1900), an American statesman, the author of the famous silver and antitrust laws that bear his name. He was a brother of the Union general, William T. Sherman, who was a Federal leader in the War of Secession, and was born at Lancaster, Ohio. During the war John Sherman was as active in the financial affairs of the nation as his distinguished brother was in the military affairs. He entered the Senate as a Republican (from Ohio) in 1861, became chairman of the Finance Committee, and was a leading advocate of the bill which established the national banking system (see BANKS AND BANKING, subhead *Banking in the United States*). In 1875, while still Senator, he secured the passage of the Resumption Act, which provided for the redemption of outstanding United States notes (see SPECIE PAYMENTS, RESUMPTION OF). In 1877 President Hayes made Sherman Secretary of the Treasury, and the duties of this office he performed with high distinction. At the close of the Presidential term Ohio again sent him to the Senate, where he remained until 1897. It was during this period that he secured the enactment of the Antitrust Law (see TRUSTS) and the Sherman Silver Act. President McKinley appointed him Secretary of State in 1897, but the outbreak of the war with Spain, in 1898, put too great a strain upon his failing powers, and he retired to private life.



JOHN SHERMAN
Probably the most influential statesman of his day.

Consult Bronson's *Life and Public Services of John Sherman.*

SHERMAN, ROGER (1721-1793), an American statesman of the early national period who had a prominent part in the drafting of the Declaration of Independence and of the Articles of Confederation, and in the ratification of the Federal Constitution. He was a native of Newton, Mass., but during his public career was a citizen of Connecticut. Before the Revolutionary War broke out he had served as a member of the Connecticut legislature, as justice of the peace, judge of the court of common pleas, treasurer of Yale College, judge of

the superior court of Connecticut and as a member of the Connecticut senate, and he was on the committees that framed the Declaration and the Articles of Confederation. In 1784 he was elected mayor of New Haven. When the first United States Congress met Sherman had a seat in the House of Representatives, but in the same year he was elected to the Senate (1791), where he represented his state until his death.

ROGER SHERMAN

SHERMAN, WILLIAM TECUMSEH (1820-1891), one of the greatest Union generals of the War of Secession, whose name is associated particularly with the famous march "from Atlanta to the sea." He was a brother of the statesman John Sherman, and was born at Lancaster, Ohio, on February 8, 1820. Left fatherless in his boyhood, he was adopted and brought up by Thomas Ewing, the first Secretary of the Interior. Sherman was graduated from West Point in 1840, near the head of the class, and entered the service with the rank of second-lieutenant of artillery. For the next few years he was stationed in the South, where he had his first experience in warfare against the Seminole Indians. In his leisure moments he studied law. During the war with Mexico he served in California as assistant adjutant-general, and in 1853 retired to civilian life and became a banker in San Francisco. Here he remained until 1857. In the interval between 1857 and the outbreak of the War of Secession he practiced law in Leavenworth, Kan., and acted as superintendent of a military academy in Louisiana.

GENERAL W. T. SHERMAN
One of the commanding figures of the War of Secession.

Sherman rejoined the army in May, 1861, and was shortly afterwards raised to the rank of brigadier-general of volunteers. In October he was placed in charge of the Department of Kentucky, but was relieved of the command by Buell in November because he reported that the campaign in the West needed an army of 200,000 men. Sherman's judgment in the matter proved to be correct. In April, 1862, he was able to give Grant substantial assistance at the Battle of Shiloh and was raised to the rank of major-general of volunteers. He continued to coöperate with Grant, and following the capture of Vicksburg was made brigadier-general in the regular army. After further valuable service in Tennessee and Mississippi, he was assigned to the chief command of the Military Division of the Mississippi.

In the spring of 1864 Sherman began his famous invasion of Georgia, with an army of 100,000 men. Atlanta was taken on September 1. Then followed the march to the sea, which ended on December 21 with the capture of Savannah. Early in 1865 he started northward, worked his way through South and North Carolina, and on April 18 received the surrender of Joseph E. Johnston's army, at Durham's Station. Lee, meanwhile, had surrendered to Grant, and the war was at an end.

Sherman remained on the active army list until 1884. In August, 1864, he had been appointed major-general in the regular army, and when, in July, 1866, Grant was made general, Congress conferred on Sherman the rank of lieutenant-general. On Grant's ascendancy to the Presidency, in 1869, Sherman became commanding general of the United States army, and he held this rank for fourteen years, when he was retired at his own request. In 1875 he published his *Memoirs,* in two volumes. B.M.W.

Consult Bradford's *Union Portraits.*

SHERMAN, TEX., the county seat of Grayson County, is a thriving manufacturing city and shipping center in the northeastern part of the state, fifteen miles south of the Oklahoma state line. It is ten miles south of Denison and sixty-four miles north and east of Dallas, and is connected with both cities by interurban lines. The railroads intersecting here are the Frisco Lines, the Houston & Texas Central, the Missouri, Kansas & Texas, the Saint Louis Southwestern, the Texas & Pacific and the Missouri, Oklahoma & Gulf. The population, which in 1910 was 12,412, was 13,667 (Federal estimate) in 1916. The area is more than four square miles.

The educational institutions of the city include Austin College (Presbyterian), North Texas Female College (Methodist), Carr-Carlton Col-

lege (Christian), Kidd-Key Conservatory of Music and Saint Joseph's Academy. Two hospitals conduct nurses' training schools. Sherman has a Federal building completed in 1907 at a cost of $145,000, a Carnegie Library, a Y. M. C. A. building, Saint Vincent's Sanitarium, and Birge and Fielder parks. Among the city's manufacturing plants flour mills are of first importance, with an annual production of between $3,000,000 and $4,000,000. Cottonseed-oil products, including cooking compounds and soap, manufactured here, find a large home market and are shipped to Mexico and South and Central America. Washing compounds, patent medicines, duck cloth, overalls and candies are also manufactured. Cotton growing and stock raising are the chief interests of the surrounding agricultural region. Sherman adopted the commission form of government in 1915.

SHIELDS OF ANCIENT AND MEDIEVAL DAYS

(*a*) Greek; (*b*) Roman; (*c*) shield of William the Conqueror (about 1066); (*d*) shield of the English Crusader in the Third Crusade (1189-1191); (*e*) method of holding the shield.

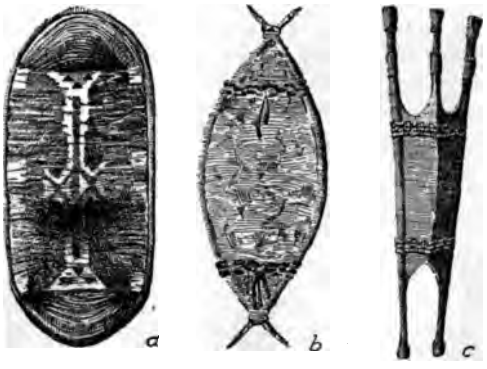
SHERRY, *sher'i,* a dry wine containing about fourteen per cent of alcohol, named from the town of Jerez, in Spain, around which lie the choicest vineyards of the kingdom. The finest grades of sherry are *amontillado* and *manzanilla.* Genuine sherry is white in color and has a delicate flavor. Several commercial varieties are found on the market. These are darkened by being mixed with brandy and other spirits, and are often amber colored. A light, white wine in imitation of Spanish sherry is made in California.

SHET'LAND ISLANDS, the most northerly possession of Great Britain in Europe, an island group lying between the Atlantic Ocean and the North Sea. They are about fifty miles northeast of the Orkney Islands, which lie off the north coast of Scotland, and are 210 miles west of Norway. The Shetlands constitute a county of Scotland. From these islands come the famous Shetland ponies, and they are also the home of a small breed of cattle and a breed of sheep noted for their long, fine wool. The islands number about 100, but less than thirty of them are inhabited, and in some cases the population is limited to the lighthouse inmates and a few shepherds. The total area is 352,319 acres, or about 556 square miles, and the population (1911 census) is 27,911. Mainland, the largest of the group, contains the county seat, Lerwick. These islands possess wild and picturesque scenery, and their rugged coasts are deeply indented. The people are engaged chiefly in fishing for herring, ling and cod, but many of them raise cattle, sheep and ponies, and the cultivation of oats, barley and vegetables is also carried on. Hosiery and shawls are the principal articles of manufacture. On the Shetlands have been found many interesting relics of the Stone Age (which see).

SHIELD, *sheeld,* a word of unknown origin, describing a piece of defensive armor borne on the left arm or carried in the left hand to ward off missiles and blows of a sword. In various forms and sizes it was the principal defense in battle from the most ancient days down to the time of the introduction of firearms. At the present time savage nations still carry shields to war. In the early Middle Ages the shield was the most important part of the equipment of both horse and foot soldiers. If held at arm's length it was called a *buckler;* if swung over the arm with the arm across the body it was termed a *target.*

Vikings of old, when setting out in their ships, hung their shields over the sides of the boat. In the twelfth century it was customary

to carry dead knights from the battle field on their shields. The shield of the ancient Greek infantry covered almost the entire body; the shield of the Romans was much lighter and smaller. It became customary in the Middle Ages to decorate the shield with many kinds of devices, the cross in various forms being much used. The device on the shield served



SHIELDS OF PRESENT-DAY SAVAGES
(*a-b*) African war shields; (*c*) a war shield from the Philippine Islands.

to identify friend and foe, which was difficult when men fought completely incased in armor.

The shields of savage races are usually made of oxhide and are hardened to such an extent that they easily resist the penetration of spears and darts. The shield has vanished from the battle field except where it is used as a protection to machine guns, and its use even for that purpose has been to a great extent discontinued.

SHIITES, *she'ites,* the lesser of the two great divisions of the Mohammedans, who reckon Mohammed's cousin Ali as the first true caliph and believe that special revelations were made to Fatima, Ali's wife. They are most numerous in Persia and India. Their worship is a corrupt form of Islam, their zeal being rather displayed in hatred of their rival sect, the Sunnites, than in obedience to the *Koran.*

SHILLABER, *shil'a ber,* BENJAMIN PENHALLOW (1814-1890), an American humorist whose articles, written under the pen name of MRS. PARTINGTON, gained wide popularity. He was born at Portsmouth, N. H., received a common school education and at an early age entered the printers' trade. Later, in Boston, he held several editorial positions with the *Post, Saturday Evening Gazette* and the *Carpet Bag. Sayings of Mrs. Partington,* homely bits of wisdom published in 1847, was successful, and was soon followed by other works, including *Rhymes With Reason and Without, Mrs. Partington's Knitting Work* and *Cruises with Captain Bob.*

SHILLING, *shil'ing,* a silver coin in the English monetary system, equal to twelve pence. There are twenty shillings in a pound, and since the pound is approximately equal to $4.86 in Canadian and United States money, one English shilling is equivalent to 24.3 cents, or practically to the 25-cent piece. The shilling is also equivalent to 1.11 German marks and to 1.25 French francs. Shillings were used in the colonial days of America, but their value varied greatly. See *Table of Equivalent Values,* page 1763, under DENOMINATE NUMBERS.

SHILOH, *shi'lo,* BATTLE OF, sometimes called the Battle of PITTSBURG LANDING, a desperate engagement of the War of Secession, the outcome of which caused the Confederates to lose their hold on Western Tennessee. The battle occurred at Pittsburg Landing, in Tennessee, near a log chapel called Shiloh Church, and was fought between Union forces under General Ulysses S. Grant and Confederate troops commanded by General Albert S. Johnston. Grant's purpose was to capture Corinth, Miss., a strong Confederate railway center twenty miles to the south.

Advancing along the Tennessee River, he stopped his forces, numbering about 33,000, to await reënforcements from General Buell, who was at Nashville, Tenn. Expecting no attack, he chose his position only with regard to its convenience as a camping ground, not as a battle field. Before Buell could join him, however, about 40,000 Confederates under General Johnston marched against the Union forces and drove them back. Johnston was killed in the fight and Beauregard was placed in command. On the morning of April 7 reënforcements from Buell's army arrived, together with a force under Lew Wallace, and the Confederates, overpowered in numbers, were forced to retreat. The estimated loss on the Confederate side was 10,669; that of the Union, 13,047. A month later Corinth was captured by the Federal army.

SHINGLES, *shing'g'lz,* thin pieces of wood of uniform length of eighteen inches, with average widths of six to eight inches, used to cover roofs of buildings. Shingles are nearly three-eighths of an inch thick at one end, from which they taper uniformly to a thickness of less than an eighth of an inch at the opposite end. When laid on a roof they must be made to overlap, one upon another, in such a man-

ner that only five or six inches of any shingle shall be exposed to the weather. Usually shingles are nailed directly upon the boards, called roofing, which cover the rafters (see Fig. 15, page 1196), but between the two tarred paper may be laid as an added protection from the weather.

If a shingle averages 18 x 6 inches in size, and only 5 inches of it lies exposed to the weather, it is clear that one shingle will cover, or be exposed on, but 30 square inches of roof. To ascertain the number of shingles required to cover a roof—

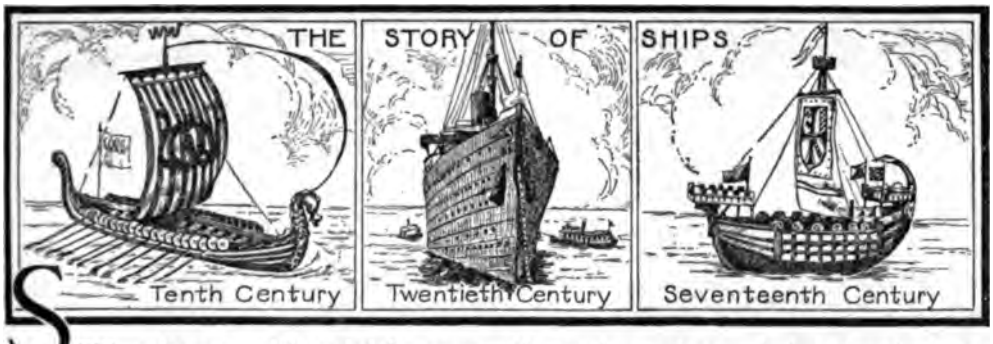
Multiply the length of one side of the roof by its breadth, in feet, then double the product, to obtain the area of both sides, in square feet. Multiply the sum of the two sides by 144, thus finding the area in square inches. Divide this product by the number of square inches of each shingle exposed to the weather; the quotient will be the number of shingles required. Divide by 200, the number of shingles in each bunch as packed for sale, to find the number of bunches required.

Sources of Supply. Shingles are made principally from cedar, which wood is most durable for the purpose, as it warps and shrinks but little on long exposure. The great shingle mills are located near vast cedar forests, therefore the main source of supply is in the Canadian province of British Columbia and the states of Washington, Oregon, California, Idaho and Montana. Other sections produce cedar shingles in smaller quantities, notably Michigan, Virginia, North Carolina, Maine, Wisconsin and Alabama, named in their order of importance.

Other Roofing Materials. While shingles are the cheapest roofing material and meet every essential demand in most communities, more expensive slates and tiles, in various colors and designs, are employed on large buildings and even on residences within prescribed limits of cities. They serve as an added protection against fire.

SHINNEY, *shin'i,* another name for hockey, described on page 2805.

SHINTO, or **SHINTOISM,** *shin'toh iz'm,* the ancient religious cult of Japan, the least developed of all the national religions, having no supreme deity and no moral code. Its central feature was sun worship, and a system of ancestor worship was also practiced. According to its traditions, the reigning emperor is descended from one of the Shinto gods. Shinto has not been able to maintain itself as a religion, but all court officials must observe its forms, as its rites have been adopted for the state religious ceremonies.



SHIP, a large vessel intended for ocean travel. When all ships were driven by the pressure of wind against sails, ships were those vessels which were fitted with at least three masts bearing square-rigged sails. Now, however, the term is applied to large vessels in general.

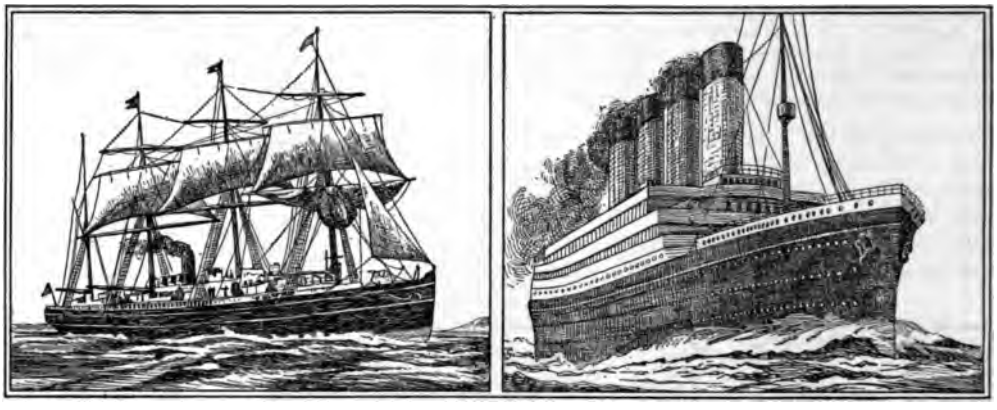
Steamship. Ships are of two sorts—sailing ships and ships propelled by steam. Steamships have now almost monopolized the passenger-carrying traffic of the world, and they have almost driven the slower and less dependable sailing craft from the sea. Men have built ships from the most ancient times, but the modern science of designing is hardly three-quarters of a century old. The tendency has been steadily to increase the carrying capacity, steadiness, comfort and speed of ships; and this has involved an enormous increase in their size and in the power of their engines. The highest type of transatlantic liner is as luxurious as a modern hotel, and carries, besides its cargo and crew, a floating population as numerous as that of a small American town.

The giant *Imperator,* of the Hamburg-American Line, is a good type of these floating hotels. It was launched in 1913. This ship has a total length of 909 feet, a width of ninety-eight

feet, and a depth from keel plate to topmost structure of almost 100 feet—about the height of an eight-story building. Engines of 62,000 horse power, consuming 1,000 tons of coal a day, drive it through the water at an average speed of twenty-three knots (almost twenty-six and one-half miles) an hour. Such a vessel as the *Imperator* provides accommodation for 800 first-cabin passengers, 600 second-cabin, 900 third-cabin and 1,700 steerage passengers. The crew numbers 1,200. In laying down the *Imperator* its owners decided to sacrifice a certain amount of speed in order to gain carrying power, so that its speed record does not indicate the full ingenuity of modern builders. The English-built ship *Mauretania* of the Cunard Line maintained a speed of twenty-seven knots for several hundred miles on its trial trip, and later kept up an average of more than twenty-six knots an hour for the transatlantic voyage. The *Mauretania* is 790 feet long and eighty-eight feet wide, and its hold is over sixty feet deep. It is driven by Parsons turbine engines of 70,000 horse power, turning four screws. The *Lusitania,* sunk by a German submarine in 1915, was a sister ship of 31,550 gross tonnage, a trifle less than that of the *Mauretania.*

The *Titanic,* of the White Star Line, destroyed by an iceberg collision in 1912, was a ship of 43,500 tons, 850 feet long, 92.5 feet wide, with a depth of 64.5 feet. It was designed for a speed of twenty-one knots. The *Olympic,* also of the White Star Line, is a ship of substantially the same model, driven by Parsons turbines and reciprocating engines, and having three screws. Such ships as these, as perfectly appointed as the most expensive of private clubs, offering even the luxury of a marble swimming bath, have been developed by keen competition for the passenger-carrying trade between Europe and America. The rise of Germany as a maritime power greatly stimulated rivalry during the last decade, and it is worth noting that a German-built ship, the *Deutschland,* established a new record between Sandy Hook lighthouse and the coast of Ireland in 1900.

The Hamburg-American Company built the great *Vaterland,* completed in 1914, and at that time the largest steamer on the seas. It has a gross tonnage of 54,300. When the War of the Nations began this steamer was interned in New York harbor and was kept there until America joined the allies in 1917. After the break between the United States and Germany the American government took over the *Vaterland,* which had been damaged by its crew, made the necessary repairs and put the steamer afloat under the American flag.



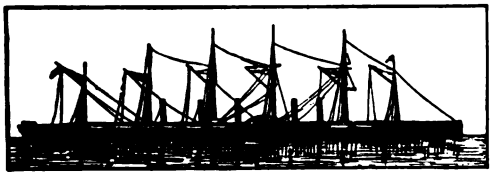
DEVELOPMENT IN A FEW YEARS OF SHIPBUILDING

At the left is the *Oceanic* of 1880, supplied with sails as well as with steam power, to lessen running expenses. At the right is a type of the great steamships of to-day.

Construction. The change from sail to steam and from wood to iron and steel in steamship construction progressed together. The *Savannah* was the first ship to steam across the Atlantic. It was laid down at New York as a sailing vessel, but was equipped with steam power and fitted with paddles. The *Savannah* made the crossing in 1819, covering the distance between Savannah and Liverpool in twenty-five days, arriving just as the scientists of England had decided that such a feat was impossible. Conservative builders were likewise distrustful of iron. Iron, they argued, is heavier than water; how can an iron ship be expected to float? Experience has now shown that the steel ship is lighter than the old wooden ship, more durable and stancher. In particular, the requisite strength at points subjected to ten-

sion is easier to obtain. In 1917 vessels constructed of concrete were projected.

The chief points considered by a designer are stability, capacity, strength and speed. For great speed, narrow, long lines are necessary, but they can be obtained only at a sacrifice of carrying capacity. The first consideration is, of course, safety. The stability of a ship in the water depends upon the proportion of its parts, the weight and disposition of the cargo



THE *GREAT EASTERN*

This vessel was not typical of boats of its day, for it was constructed for cable laying, and was made so long that people were sure they never would see another vessel of its size.

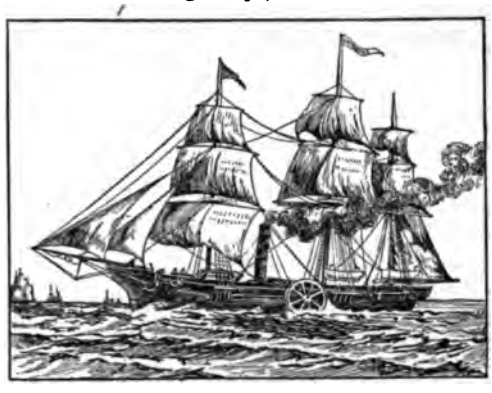
and the displacement. The displacement is measured by the weight of water the ship displaces, and this weight is equal to that of the ship with its cargo and passengers. Steel was introduced under modern conditions of building about 1870, and its use has tended to alter the lines of modern ships. Ships of wood had projecting keels, which increased their stability and rendered them more manageable. The great steel liners and freighters of to-day are built without external keels. The bottom of the ship is a keel plate of steel, extending the length of the vessel and joining the upright framework of the sides. The double-bottom system of building, developed first in the *Great Eastern* (1852), is now quite common. It has added greatly to the safety of sea travel.

In ships having a double bottom, the keel proper, which is about two feet deep, connects the central line of the keel plate with the inner bottom. It serves to support the transverse structure of ribs and joins the stem and sternposts, giving greater rigidity to the framework of the vessel. The ribs, which are of steel, are covered with a sheathing of steel plates of varying thickness. In battleships of the first line this sheathing of steel is often a foot thick, to resist the action of heavy shells. The decks are placed one above another and fastened to the framework of the sides. A cross section amidships has the shape of the letter U. The steel used in ships is known as mild steel; it is tough and pliable and so treated that it is less affected by heat and cold than tool steel.

The steam turbine engine, by which most large ships are driven, was invented by C. A. Parsons, of Sweden, in 1884. It maintains a speed of thousands of revolutions a minute, driving the twin or triple screws at racing speed. The screw was first used on ocean vessels in 1839, and has now displaced the old paddle wheels. The screw propeller is less affected by the rolling of a ship than are paddles, and it acts on a relatively greater volume of water in a given time.

Experiments which had been conducted during a considerable period culminated in 1888 in the use of petroleum spirit for fuel instead of coal. The naphtha launch and the high-speed racing boat were later developments. They are driven by internal combustion engines, the power being applied directly by a succession of small explosions within the engine. Large motors burning heavy oil fuels have been installed in vessels of considerable displacement, but their use is still confined chiefly to craft of smaller types. There is a tendency in present-day warship building to install oil-burning engines.

The use to which the ship is to be put determines the design. Passenger vessels ride high in the water, so as to afford ample light and air for the tiers of cabins. Cargo vessels, on the other hand, ride much lower, especially when laden. These cargo ships, sometimes called *sea*



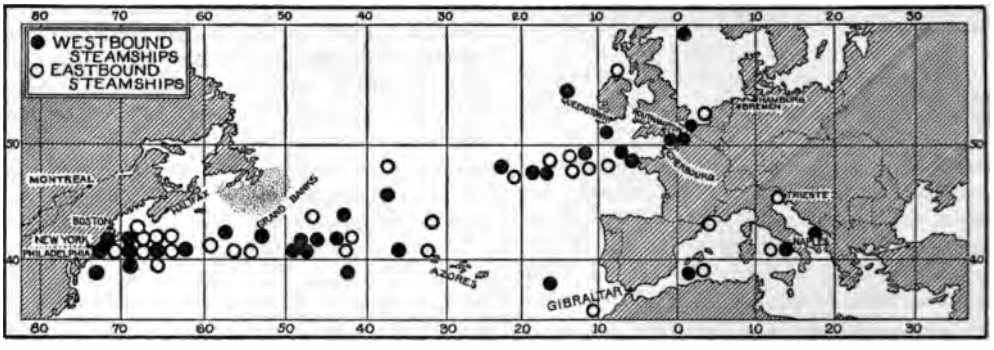
THE *SAVANNAH*

The first steaming vessel to cross the Atlantic Ocean. The feat was accomplished in 1819.

tramps, do a great part of the world's carrying. They maintain an average speed of from ten to eleven knots, being built for capacity rather than for speed. The freighter of the Great Lakes is regarded as a model of adjustment to the ends it serves. Ore carriers like the *J. Pierpont Morgan* are built 600 feet long and with a 60-foot beam. They carry 12,500 tons of coal or ore, or 450,000 bushels of grain. The

bottom is flat and the sides are almost vertical, so the cargo can be lifted with great scoops in about ten hours.

Sailing Ships. The sailing ship had developed many distinct types before the era of steam, the chief of which was the full-rigged ship with at least three masts supporting square sails. Vessels of the schooner type are fore-and-aft rigged, and all sailing vessels may be divided into fore-and-aft rigged and square-rigged or some combination of the two. In spite of the competition of steam, sailing ships still keep the seas, crawling to all the ends of the earth with their cargoes. These surviving "wind-jammers" cannot be compared in grace of line or speed with the smart clipper ships of former days.



A WINTER DAY ON THE ATLANTIC

This is a map such as newspapers publish to show the daily progress of ships on their way across the ocean. Each circle on such a map is given a number in daily reports so that any boat can be identified. The day of which this is a record was early in 1914, before the War of the Nations interrupted regular sailings. The map does not show the separate east and west lanes, but it illustrates the fact that in winter and spring the boats keep to the south when near the American coast, in order to avoid icebergs. The shorter summer route to England from the United States passes close to the Grand Banks. From about August 24 to January 14 westbound steamers travel 2,856 miles between the last light on the English coast and New York; eastbound boats have a course 30 miles longer. About January 15 ships begin to use the southern route, which is 2,953 miles in the westbound lane and 2,996 miles in the eastbound lane. When it is stated that only vessels that carry passengers are reported on these maps a good idea is obtained of the extent of sea travel.

Between the fifteenth century and the application of steam, the sailing ship went through a long evolution. The fifteenth century ship was clumsy and unseaworthy, but the discovery of America gave great impetus to maritime development, and the lines of sailing craft were steadily bettered. Spain took the lead, yielding later to France and Holland and finally to England. Such ships as the *Sovereign of the Seas,* the first three-decker, cost England about $1,500,000, in the seventeenth century. It was 168 feet long and forty-eight feet in the beam and mounted 100 guns. American ship carpenters were cunning workmen and were among the first to avail themselves of the investigations of Scott Russell into the principles of construction. Russell announced his principles in 1832; shortly afterwards, the Americans began to lay down the fastest ships afloat. Their famous clipper ships had sharp bows and a deep stern; they were long and low in the water, and carried slender spars with a great spread of canvas.

Battleship. See WARSHIP.

History. The earliest known builders of ships were the Egyptians, but it is believed that they derived their knowledge from neighboring peoples whose records have been lost. The Phoenicians were the greatest builders of antiquity. They were colonists and bold navigators, who developed the "long" fighting ship, propelled by three banks of oars. The Romans also used long vessels with several banks of oars, the trireme having been probably from 100 to 160 feet in length. War galleys had one or two masts with square sails bent to yards. Among the barbarian peoples of the North, the great builders were the old Norse sea rovers, who understood the art of building ships that were quite seaworthy.

Disasters at Sea. In spite of improved construction and the use of steel, the greatest vessels that man can build are not beyond the reach of peril. Of late years there have been several appalling wrecks, in which hundreds have lost their lives. The sinking of the *Titanic* by an iceberg in April, 1912, with a loss of over 1,500 lives, was one of the worst of recent disasters. In May, 1914, the *Empress of Ireland* sank in the Saint Lawrence River as the result of a collision, carrying over a thousand passengers to the bottom. When the *Lusitania* was torpedoed at sea in May, 1915,

1,150 persons lost their lives. In July, 1915, the lake steamer *Eastland* turned over in the Chicago River, while still tied to the wharf, and carried to their death 852 excursionists. G.B.D.

Consult Taylor's *The Speed and Power of Ships;* Biles' *The Design and Construction of Ships;* Chatterton's *Steamships and Their Story;* Howden's *Boys' Book of Steamships.*

Related Subjects. In connection with this article, the reader is referred to the following topics in these volumes:

Anchor	Mate
Constitution, The	Navigation
Dock	Navy (with list)
Dockyards	Quarter-deck
Frigate	Sailboat and Sailing
Galley	Sounding
Gondola	Tacking
Lead, Sounding	Titanic
Life-Saving Service	Tonnage
Lighthouse	Warship

SHIRAZ, *she rahz',* a city of Persia, capital of the province of Farsistan, famous throughout Asia for its wines. It is situated in the southwestern part of the country, 112 miles from the Persian Gulf, and is about 4,750 feet above the sea (see map, opposite page 417). A great stone wall shuts off the city from the surrounding plains, which are rich with vineyards and orchards and fragrant with rose gardens. Founded in A.D. 697, Shiraz, with its beautiful location, healthful climate and magnificent buildings, was for a time a center of culture. Destructive earthquakes, however, laid much of it in ruins, and the rebuilt portions do not compare favorably with the original structures. The city contains colleges, bazaars, beautiful mosques and other public buildings, and among its manufactures are cotton and woolen goods, silk, glass, inlaid articles and rose water. It has been the birthplace of many scholars and poets. Population, about 55,000.

SHIRE, *she'ray,* an African river, rising in Lake Nyassa. After a course of about 300 miles it joins the Zambezi about ninety miles from the Indian Ocean. In most parts the river is a broad, navigable stream, but it is interrupted by rapids and cataracts. The Murchison rapids, in its upper course, has a fall of 1,200 feet. The Shire was discovered by David Livingstone. The surrounding country is fast being developed into an important agricultural district.

SHODDY, *shod'i,* a term promiscuously applied to anything which is an imitation of something of known good quality, or that which is cheap and poor in quality. This application is, however, wrong, as the term should only be applied to goods that have been rewoven. In the process of wool manufacture there is a certain percentage of waste, a portion of the wool is "shed." The term *shed* has been changed into *shoddy,* to describe an industry of English origin, the making of fabrics from shed, or cast-off materials.

This industry has assumed important proportions in England, the United States and Canada. There is everywhere a market for cast-off clothing and rags, which are collected and sorted into grades of wool, wool and cotton, all cotton, etc. The rags are torn apart by machinery, dusted by beating and fanning and reduced practically to a state of unspun wool. The rags which contain both cotton and wool are treated with sulphuric acid, which destroys the cotton fibers but leaves the wool intact. The wool thus separated is spoken of as *extracted.* The wool thus obtained, having been once woven and then broken up again, is naturally in short pieces, and to make a good weave must be blended with some other material. For this blending wool of low quality is employed, or cotton may be used. The result is naturally inferior to that obtained from unused wool, but still produces fairly satisfactory material.

Shoddy is now made to appear so exactly like original cloth that the purchaser is practically at the mercy of the merchant, only an expert being able usually to distinguish between shoddy and new goods. In European countries shoddy is sold under its proper name, with no effort at deception, and the price is accordingly low. The shoddy industry, openly carried on as such, is of undoubted benefit, and many Europeans are enabled by it to clothe themselves in a way absolutely impossible before the introduction of this cheap material. In the United States much shoddy is sold, and the honest merchant explains its character. Shoddy clothing may wear excellently, and frequently makes an attractive looking garment. See ADULTERATION OF FOODSTUFFS AND CLOTHING.

SHOES, *shooz.* See BOOTS AND SHOES.

SHOGUN, *sho'goon,* a Japanese term for *great general,* or commander in chief. For several centuries previous to 1868 the shogun class, or shogunate, had exercised the real power in Japan, though nominally subject to the emperor. In 1192 the emperor Takahira made Yositomo, the Minamoto leader, a *Sei-i-tai-shogun,* meaning *barbarian-subduing, great general.* Successive generals held the title until it became practically hereditary in the Tokugawa family.

The revolution of 1867 restored the power of the emperor and the title of shogun was abolished the following year. Foreigners sometimes apply the title *tycoon* to the shogun. This is merely the English rendering of the Japanese *taikun,* meaning *great lord.* With the abolition of the shogun also came the abandonment of the old samurai military system.

SHOOT'ING. See MARKSMANSHIP.

SHOOTING STAR. See METEORS.

SHORT BALLOT, one of the recent proposals for government reform in the United States, is, as its name infers, a ballot containing but few names of candidates for office. The short ballot movement proposes that only the most important offices shall be filled by election, and that all others shall be made appointive and dependent upon a central authority, or upon the heads of the departments through which their work is done. In brief, the end sought is centralization of authority and responsibility.

The short ballot principle advocates what is almost the same as a commission form of government, under which a small number of officials are elected to fill important offices, who in turn appoint men to work under their direction in the administration and conduct of city or county affairs. Under such a system the appointment of men can be made according to fitness, entirely independent of popular favor or political influence.

It is being more and more realized that the affairs of a city or county should be conducted on strictly modern business principles, and the short ballot offers decided advantages for facilitating the appointment of men calculated to give good service to the community. With a ballot containing column after column of candidates' names, the average voter concerns himself with only a few of the most prominent. There are many others of which he knows little. With a ballot limited to five or even ten candidates the average voter would be moved to investigate the fitness of those who would manage the affairs of the public. The result of the vote would be an intelligent expression of opinion.

The short ballot might remove all county officials from the elective list except the county supervisors, or commissioners. These directly represent the people and to them could be intrusted the task of selecting the men fitted to conduct the public business. Electing an official to perform certain duties and then denying him the right to appoint the men who are to assist him in performing those duties is to handicap him from the start. In some states there is a demand that only the governor, lieutenant-governor and judges shall be elected officials, and that all other state officers shall be appointive. F.ST.A.

Related Subjects. The reader who is interested in this discussion of the short ballot may consult the following articles in these volumes:

Australian Ballot	Election
Ballot	Electoral College

SHORTHAND WRITING, a system of writing by symbols which so shortens labor that in recording speech the pen can keep pace with the voice. There are four standard systems in general use which are fundamentally the same; these are the Isaac Pitman, the Benn Pitman, the Graham and the Munson. A person who has learned one of the last three will experience slight difficulty in reading notes written in the other two systems; and if the few variations in the Isaac Pitman system are explained to him he can read it, also.

This is possible because of the various modern schemes of shorthand writing. Isaac Pitman was the inventor of what is declared to be a very philosophical and flexible system, and the others have appropriated his foundation principles. He was an Englishman, and in England his work has been adopted practically to the exclusion of all other systems. Isaac's brother Benn, of Cincinnati, Ohio, adopted the same system with about a dozen slight variations and offered it to the American public. Before he did so, however, Andrew J. Graham, of New York, took the Isaac Pitman system and expanded it to the point where it came to be recognized as the fullest, most complete and most flexible of all systems of shorthand writing. James E. Munson was the third American to build upon the foundation laid by the English Pitman. When the term "Pitmanic shorthand" is used, it refers to the systems, alike in principle and varying only in details, built by the four men named above. Other men of lesser note have also published what they term Pitmanic systems.

However, all shorthand is not Pitmanic. In a hurrying age someone discovered that from six to eight months is too long a time to spend in mastering the art of shorthand writing, even though results might abundantly justify it. Why could it not be possible to devise a system which, though it might lack the philosophical basis and some of the flexibility of the existing systems, could be mastered in

shorter time? The question has been answered by many authors; some of these have produced excellent systems, comparing well in working features with the older ones, but many have disappointed themselves and the public.

To meet the demand for systems easier to learn yet which should be practical, many people have labored. Some have declared that they have perfected systems that can be mastered in thirty days, or less; the statements have not been fraudulent, but the results offered have been so brief and so lacking in the possibility of expansion that the students who have mastered their details have found the doors to efficiency and to expertness closed by their very limitations.

Name	Phonograph	Sound of	Direction written
P		p as in pope	Downward
B		b " babe	"
T		t " tight	"
D		d " dead	"
Chay		ch " church	"
J		j " judge	"
K		k " kick	Left to right
Gay		g " gag	"
Ray		r " roar	Upward
Hay		h " high	"
F		f " fife	Downward
V		v " vat	"
Ith		th " path	"
The		th " thy	"
S		s " saw	"
Z		z " zeal	"
Ish		sh " wish	"
Zho		z " vision	"
L Lay		l " lull	" Upward
Yay		y " yet	Downward
R		r " roar	"
Way		w " wake	"
M		m " maim	Left to right
Emp Emb		mp " hemp mb " ember	"
N		n " noun	"
Ing		ng " thing	"

PITMANIC CONSONANTS

Among the non-Pitmanic systems the one which has been most successful and is on an enduring and popular basis is the Gregg, the invention of John Robert Gregg, formerly an Englishman. When he introduced it into America he was living in Boston; later he moved to Chicago, where permanent headquarters were established. The Cross Eclectic Shorthand, another candidate for favor, was devised by J. George Cross; it met with temporary success, but was found too complicated to be widely adopted. Other systems which have bid for favor are the Dement, the Pernin, Longley's Takigraphy, the McKee and the Scovell. A list of many still less important might be printed, for it is known that no fewer than 1,070 works on shorthand writing have been printed in the English language.

Inasmuch as the school that teaches a system not the Gregg or one of the four leading Pitmanic systems is a most unusual exception, this review confines its descriptive paragraphs to these two leaders in the shorthand world.

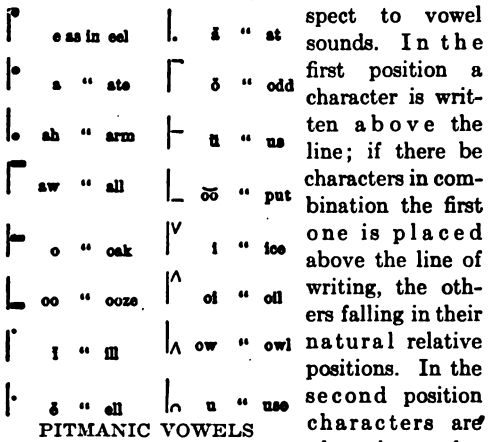
Pitmanic Shorthand. The Pitmanic systems derive their characters from parts of the circumference and the radii of a circle. There are only twenty-four sounds which it is found necessary to represent, but there are twenty-six characters, for *r* and *h* have two characters each, used at will. Light and heavy dots and dashes represent the vowels. When a person has learned these characters and the vowels and their positions he can write shorthand, slowly, it is true, and clumsily, for at that point he really begins to master the true art of his subject. There are hundreds of characters formed from consonant combinations which represent words; these are not always arbitrarily fixed, for in the signs and combinations are usually suggestions of the word or words which the signs represent.

Either *t* or *d* may be added to a great many words by making their consonant signs half length, as *pay, paid;* this is convenient for the past tense, but it is more often employed in forming words ending in *t* or *d*. Thus *act* is written with the half-length sign for *k*, etc. Doubling the length of a consonant stroke adds the syllable *thr*.

What are called initial and final *hooks* are ingeniously employed. The hook is essentially a half circle attached to the beginning or to the end of a consonant stroke.

A small circle at the beginning or at the end of a consonant stroke adds the sound of *s;* a circle double the size adds the sound *ses*. A short enclosed loop attached to a consonant adds *st;* a loop twice as long adds *str*. There are further modifications of the circle, hook and loop which with a single brief stroke of the pen add frequently-recurring syllables.

The flexibility of the system briefly described is largely due to the three positions in which all characters may be written, with respect to vowel sounds. In the first position a character is written above the line; if there be characters in combination the first one is placed above the line of writing, the others falling in their natural relative positions. In the second position characters are placed on the line; in the third, below or through the line. Another feature which provides added flexibility is that all strokes are made both light and shaded.

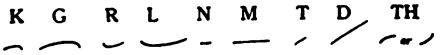


PITMANIC VOWELS

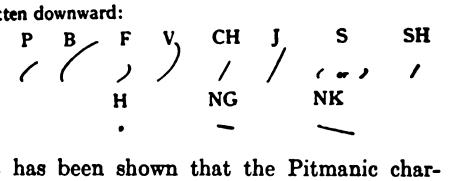
The upright lines are placed only to show locations of the vowel characters in first, second and third positions.

Gregg Shorthand. Of the non-Pitmanic shorthand systems the Gregg has probably met with greater success than all its competitors outside the Pitmanic group. The Gregg is a radical departure from everything that had preceded it. The claim is made that it can be learned in one-half the time a Pitmanic system requires. It is a light-line system, there being no shaded characters; two or three or five positions for writing the characters, which characterize other systems, are unknown, for all writing is on one line; vowels and consonants are joined, and follow each other in their natural order. Gregg writers are taught many contractions, but they are not obliged to learn as many word-signs as are presented in the Pitmanic systems.

Written forward:

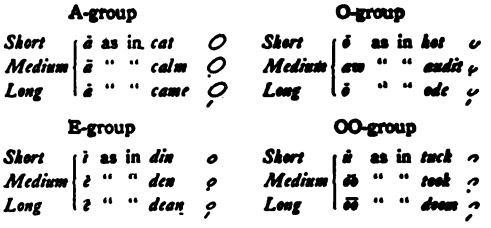


Written downward:



It has been shown that the Pitmanic characters are based on straight lines and the parts of a circle; the Gregg characters are straight lines and parts of elliptical figures. The illustration in the preceding column gives the consonant representations.

The vowels are presented in groups, arranged conveniently by their sounds:



The following are the dipthongs used:

The promoters of the Gregg system claim that a million people have adopted it for daily use. Figures are not available for any of the Pitmanic systems, except that it is stated that ninety per cent of the court reporters of the United States employ either the Graham or the Benn Pitman phonography.

Historical. Shorthand was an ancient art, but was apparently almost lost to the world during more than seven centuries. In the first century B. C. Marcus Tullius Tiro, secretary to the great Cicero, invented a crude shorthand system, and called it *brief writing*. Others enlarged upon his invention, and in the fifth century the system contained 13,000 characters. In the eighth century, for reasons unknown, the art disappeared; in the year 1500 there were found notes in the old Roman brief writing of about the year 800.

The beginnings of modern shorthand date from 1588, when Timothy Bright prepared a list of several hundred words with abbreviations. It was not at all practical, but inspired others to similar efforts. The best production of the seventeenth century was by William Mason, who named his textbook *A Pen Plucked from the Eagle's Wing*. Following him were over a dozen Englishmen, who produced more or less elaborate brief-writing systems, but not any of them interested great numbers of people. Not until Isaac Pitman published his *Stenographic Sound Hand* in 1837 and his *System of Phonography* in 1840 did shorthand writing command the attention of the entire world. E.D.F.

SHORTT, ADAM (1859-), a Canadian economist and educator, after 1908 a member

of the Dominion Civil Service Commission. He was born at Kilworth, near London, Ont., and was graduated from Queen's University, at Kingston, in 1883. Later he pursued special studies at the universities of Glasgow and Edinburgh. He joined the staff of Queen's University in 1885, and remained until 1908, when he accepted the appointment to the Civil Service Commission. In 1911 he was created a Companion of the Order of Saint Michael and Saint George (C.M.G.). Among his published writings are *Imperial Preferential Trade; Documents Relating to the Constitutional History of Canada, 1759-1761* (jointly with A. G. Doughty) and a biography of Lord Sydenham. Together with A. G. Doughty he also edited *Canada and Its Provinces,* a twenty-four-volume reference work.

SHOSHONEAN, *sho sho'ne an,* **INDIANS,** a great family of North American tribes who originally occupied a vast territory between the Rocky Mountains and the Sierra Nevadas. To this group belong the Hopi, the only Shoshonean tribe that settled in permanent villages and followed the arts of weaving, pottery and agriculture. The other tribes lived a wandering life, obtaining a food supply by hunting, fishing and gathering seeds and roots. The Utes and Banaks were the most warlike of the Shoshonean Indians. The group numbered 16,842 in 1915.

Related Subjects. The more important Shoshonean tribes are described in detail in these volumes under the following headings. In addition to them, see INDIANS, AMERICAN.

Comanche	Shoshoni
Hopi	Ute

SHOSHONI, *sho sho'nee,* or **SNAKE,** a division of the Shoshonean group of North American Indians, who inhabited the mountainous region of Wyoming and Montana, Central and Southern Idaho, Northeastern Nevada, Eastern Oregon and a small part of Utah west of Great Salt Lake. They were frequently called Snake Indians by those who thought that their tribal sign—a waving motion of the first finger—stood for snake. The eastern bands were called *Horse,* or *Buffalo,* Indians, because they kept horses and sometimes hunted the buffalo. Those farther west were a degraded type, said to be among the lowest order of men. As the barren country was devoid of large game, these Indians depended for food, to a large extent, on fish, small animals, roots and seeds. These western bands were often called *Diggers,* and sometimes *Walkers,* because they were too poor to own horses. The eastern tribes lived in teepees, but those in the sagebrush country used brush shelters. The Shoshoni now live on reservations in Idaho, Nevada and Wyoming, and in all number about 3,000. See INDIANS, AMERICAN.

SHOT, a term formerly used to describe the solid projectiles fired from cannon, but not considered in that sense since the introduction of modern shell. The term *shot* is now applied only to the smaller projectiles used in sporting weapons called shotguns. Shot for sporting purposes vary considerably in size, according to the purpose for which intended. For ordinary hunting, when the game may be partridges, snipe, woodcock or other birds, one ounce or one and one-eighth ounce of small shot are loaded in each cartridge. For larger game larger shot are used. Shot of the sporting type are made by pouring the melted lead through the holes of a colander placed at a considerable height above water, the drops of lead naturally assuming globular form and solidifying when coming in contact with the water. The different shot are numbered according to size.

SHOT, PUTTING THE, one of the contests in a track and field meet. When the Irish had their national games in 1829 B. C., or when Douglas, in the *Lady of the Lake*—

> sent the fragment through the sky,
> A rood beyond the farthest mark,

a heavy stone was the test of strength. Now an iron ball is used; one weighing sixteen

PUTTING THE SHOT

The illustration shows the three principal positions assumed; the start of the put, just before taking the hop; landing in the center of the circle just before the final heave; the finish, with the body thrown forward before the arm shoots out.

pounds is prescribed for senior athletes and one of twelve pounds for boys.

Success in shot putting depends upon ability to get the whole force of the body behind the heave. Throwing, in which the arm does more work, is prohibited. The put is made from

within a circle seven feet in diameter, which is usually bounded at the front by a wooden cleat (see illustration). Standing at the back of this circle, the shot putter balances the shot loosely in his hand, with the weight carried between the palm and the central fingers, the hand resting on the shoulder, and the elbow close to the body. If he is right-handed he stands with the left foot ahead, then hops forward to a position in which this foot is near the cleat, immediately jumping around so that the positions of his two feet are reversed and his weight well forward on the right foot. It is this last jump which gives force to the shot, and the arm is not thrust out till after it. The shot should be sent into the air at an angle of forty-five degrees. C.H.H.

SHOT'GUN, a gun with a smooth bore, generally used for shooting small game. Until recently shotguns were made with one and two barrels and occasionally with three, and the two latter yet find favor, but the single-barreled magazine or "pump gun" is steadily increasing in popularity. The standard shotguns are called 10- 12- and 16-bore, the 12-bore being the most generally used. The standard of measurement for the bore of a shotgun is the weight of bullet required to fit it. If a bullet weighing one-twelfth of a pound fits the bore, it is called a 12-bore gun; if one-tenth of a pound is the weight of the bullet, the bore is 10, and so on. The most improved shotguns, which means nearly all now in use, are breech-loaders, the cartridges, or shells, being inserted at the breech. The cartridge contains an explosive charge and a load of lead pellets called shot, varying in size according to the game to be hunted. From six to a dozen cartridges can be placed in a magazine gun.

For many years after the invention of the breech-loading shotgun, first made in 1836, no such guns were made in the United States, but now there are many factories producing weapons of great beauty and efficiency. The highest quality guns have Damascened or laminated steel barrels. Damascene barrels are built up of twisted bars of steel; laminated barrels are solid rods, bored to the required size.

Shotguns vary considerably in price, some costing less than $10, while improved guns by well-known makers cost $200 or more. Shotguns which are fired by mechanism concealed in the breech are called *hammerless,* and are usually preferred to those with visible hammers which sometimes rise above and interfere with the line of sight.

The effective range of a 12-bore shotgun loaded with 1⅛ ounces of shot is usually not more than sixty or seventy-five yards, the best range for rabbits, partridges, pheasants and other small game being forty to fifty yards. In two-barreled guns the left barrel is generally "choked," that is, made slightly smaller at the muzzle than at the breech for the purpose of condensing the shot. The barrels are usually twenty-eight inches long, and the gun weighs from six to seven pounds. F.ST.A.

Related Subjects. The reader is referred to the following articles in these volumes:

Firearms — Rifle
Marksmanship — Small Arms

SHOVELBOARD, *shuv''l bohrd,* a form of the word SHUFFLEBOARD (which see).

SHOVELER, *shuv'el er,* a river duck having a bill widely expanded at the end and with the upper mandible overhanging the lower. Its plumage is a mixture of green, white and chestnut. Like others of its kind, it feeds in

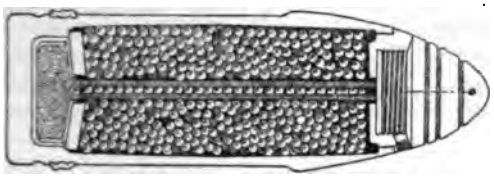
THE SHOVELER

shallow water, probing with its head immersed for mollusks, insects, roots, etc., and straining out the mud and water through "gutters" in the sides of its bill. The *common shoveler* is found in Northern Europe, Asia and America, migrating southward in winter. It nests on the ground, sometimes at a distance from water. The eggs number six to ten and are pale greenish, bluish-white or creamy buff.

Species of the shoveler are also found in South America, South Africa and in the Australian region.

SHRAP'NEL, a modern form of projectile used in field and naval guns. The shrapnel was invented by Lieutenant Henry Shrapnel (afterwards lieutenant-general) of the British

army in 1784, and is now recognized as the most reliable and effective of all modern shells. The shell contains a number of balls and a

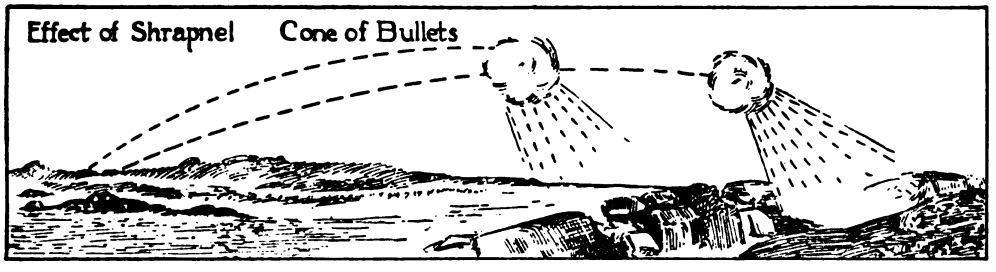


CROSS SECTION OF SHRAPNEL

The ordinary shrapnel shell is about ten and one-half inches long and nine and one-half inches in circumference, and costs the purchasing government $15. Hundreds of thousands of these shells were fired daily during the War of the Nations.

charge of powder which bursts the shell, imparting to each bullet the velocity of the shell as a whole at the moment of bursting.

Effectiveness. Destructive effect over as large an area as possible is sought by the use of shrapnel, which on land is used mainly for clearing covered spaces, dislodging the enemy from entrenched positions, or to destroy troops in open positions, by the shower of bullets forced out by the explosion of the shell. Fired at what is called effective range, which varies according to the caliber of the gun, the bullets from shrapnel shell sweep an area of about 250 yards by 30 yards, the forward movement of the bullets being more than eight times greater than the lateral speed. German field guns fired at 3,300 yards, the most effective range, using a Krupp shell with a steel body, strike with great effect nearer *underneath* the explosion than any other shell yet introduced. This shell is effective when used against deeply en-



THE DEADLY HAIL OF BULLETS FROM SHRAPNEL SHELLS

Behind a curtain of fire such as is shown in the illustration troops may advance upon an enemy with assurance that they will not be attacked by a hostile advance.

Changes in Modern Shells. With the introduction of the rifled barrels for big guns, the shell was altered, but the principle remained the same. In modern shrapnel the size of the bullets has been reduced and the number contained in the shell therefore increased; now the total effective weight of the bullets contained is equal to about fifty-three per cent of the total weight of the shell. The bursting charge may be placed at the base or at the front of the shell, and in naval shrapnel is sometimes placed in the center. The 5-inch British howitzer fires a shell of 45 pounds weight, containing 22½ pounds of bullets, the firing charge being 9$^{7}/_{16}$ pounds of cordite, giving effective range up to 11,000 yards. The original shrapnel shells contained bullets weighing 18 to 34 to the pound, about one-quarter of the total weight of the shell being bullets. The modern field guns of 3-inch caliber fire shrapnel containing about 365 bullets, 42 bullets weighing a pound. The United States 3-inch shrapnel contains 242 bullets, each about one-half inch in diameter.

trenched positions, the bullets coming almost directly down on to the men in the trenches.

The fuse by which shrapnel is exploded may be set for time, for the instant of concussion, or may be prepared to explode when even slightly grazing an obstacle. The explosion on graze is of great advantage when firing against shielded guns.

The bullets from shrapnel shell inflict a wound of quite a different character from that caused by a modern rifle bullet, which makes a clean puncture and practically sears its own wound. The shrapnel bullet has high velocity, but it has not the steadiness of the rifle bullet, which revolves on its own axis; therefore, it is liable to make a much larger and more jagged wound than its size would necessitate if of steady flight. The shell itself also bursts into pieces of uneven size and inflicts terrible injuries.

The shrapnel mostly in use in the United States army is what is called the 3.2-inch shrapnel, with the explosive charge in front of the bullets. The total weight of the shell fired

bears a definite relation to the caliber of the gun. In naval guns the total weight of the shell is equal to the cube of the caliber divided by two. For example, when speaking of a 6-inch gun, that means the caliber of the gun. The approximate weight of the shell fired by that gun would be 6×6×6=216, divided by 2=108 pounds, total weight of the shell. The length of the shell is usually 3½ times the caliber, so that the 6-inch gun would fire a shell 108 pounds in weight and 3½ times 6, or 21, inches in length. The shrapnel shell is 3½ and sometimes 4 calibers in length, the 3-inch field guns thus firing shells of 10½ or 14 inches in length. F.ST.A.

See the articles AMMUNITION and ARTILLERY, and the note following the last-named title.

SHREVEPORT, *shreev'port,* LA., the county seat of Caddo Parish, and the second largest city in the state, ranking next to New Orleans. It had a population of 28,015 in 1910; this had increased to 35,230 in 1916 (Federal estimate). The area is more than nine square miles. The city is situated in the northwest corner of the state, 170 miles east of Dallas and 326 miles northwest of New Orleans. It is on the Red River, at the head of navigation, and is the junction of the Houston & Shreveport, the Kansas City Southern, the Louisiana & Arkansas, the Louisiana Railway & Navigation Company, the Missouri, Kansas & Texas, the Saint Louis Southwestern, the Texas & Pacific and the Vicksburg, Shreveport & Pacific railroads.

The city has Lakeside, Princess and Schumpert parks, a Federal building erected in 1912 at a cost of $100,000, a parish courthouse which cost $200,000, a city hall, Masonic temples, Elks' Club, Hotel Youree, and fine churches and banks. Centenary College (Methodist), the State Charity Hospital, two private hospitals and the Genevieve Orphanage are the principal institutions. A municipal market is one of the city's industrial advantages. At Shreveport is held the Louisiana State Fair.

Because of its fine trading facilities and the natural wealth of the surrounding country, Shreveport has become an important distributing center for a wide area. Caddo Parish has rich oil fields, and the yearly value of the output of the city's refineries runs into millions of dollars. Cotton is the chief crop of the adjacent country. The principal manufactures are window glass, bottles, machinery, sash, doors, blinds, safes and vaults, silos, stoves, fertilizers, cotton and peanut oil.

Shreveport was settled in 1827 and was incorporated as a city in 1834. In 1910 the commission form of government was adopted. J.E.H.

SHREW, *shroo,* a family of insect-eating mammals, including among the several species the smallest animals known that suckle their young. They are widely distributed in both the eastern and western hemispheres, and are

THE SHREW

found chiefly in fields, woodlands and gardens, though some live part of the time in water, and others frequent the marshes. As may be seen from the accompanying picture, shrews look very much like mice, but in habit they are more nearly related to the moles. They have long, slender snouts that can be moved at will, and tiny eyes and ears, and their bodies and tails are covered with dark, short hair. Insects and worms form the chief part of their diet, but some species feed on young birds and other small creatures of the woods.

Several larger animals prey upon the shrews, such as weasels, foxes and owls, but their strong, musky odor protects them from some of their natural enemies. The smallest shrew known is found in Italy and is but an inch and a half in length. In America there are several species, the largest, the *water* shrew, being six inches long. The *short-tailed,* or *mole,* shrew of Eastern United States is a flesh-eating species. Another American shrew, called *shrew mouse,* is found in large numbers about marshes and streams. It is much lighter in color than the mole shrew. These little creatures are harmless, and they are useful in gardens because they prey upon insects and grubs.

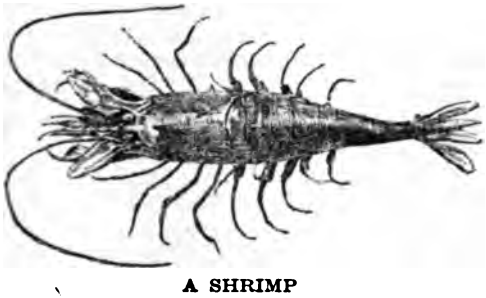
SHRIKE, *shryk,* two species of North American birds, known respectively as the *northern shrike,* or *butcher bird,* and the *loggerhead shrike.* The former ranges from the far north in summer to Kansas and Virginia in the win-

ter, while the latter is found principally south of this area. Shrikes are easily recognized by their strong, hooked beaks and their colors of gray, black and white. They have a habit of impaling the grasshoppers, mice and smaller birds upon which they prey on thorns, fence barbs or forked twigs, and of tearing them to pieces in this convenient position. Their nests are built of small sticks and grasses in low trees or bushes. The eggs are three to five in number, of a dull or creamy white color, thickly marked with cinnamon and lavender.

THE SHRIKE

The shrikes of the Old World include a confusing number of species, only a few of which are true shrikes. It is said that the name originated in imitation of their harsh screeches or shrieks.

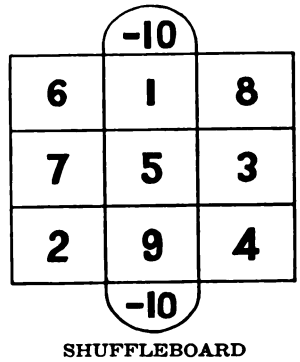
SHRIMP, a group of shellfish resembling the crawfish (which see) and of considerable commercial importance as a food. The common shrimp of the North Atlantic shores of Europe and America is about two inches long and is greenish-gray in color, with spots of brown. Its body is delicately constructed and is semi-transparent. The shrimp is provided with a pair of long feelers, and its front pair of feet have pincers for grasping prey. These animals frequent shallow waters where there is a sandy bottom, and when in danger they hide in the sand. They are caught in nets, and are marketed in canned form.



A SHRIMP

SHROVE TUESDAY, in the Roman Catholic Church, is celebrated the day before Ash Wednesday, which is the beginning of the Lenten season. It was so called from the old custom of confessing or receiving *shrift* on that day, but at the present time, in most Catholic countries and communities, it is a great festival of rejoicing, preceding the penitential season. It is the *Carnival* of the Italians, the *Mardi Gras* of the French and the *Pancake Tuesday* of the English. In the city of New Orleans it has been celebrated since 1857 by a wonderful street pageant, brilliant masque balls and other festivities. See MARDI GRAS.

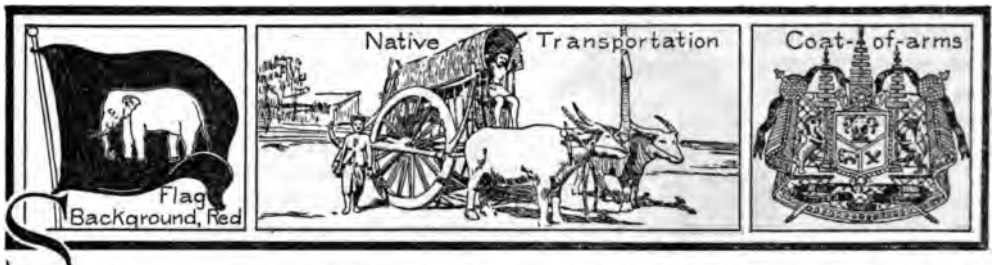
SHUFFLEBOARD, *shuf''l bohrd,* or **SHOVELBOARD,** *shuv''l bohrd,* a game played indoors and on decks of ocean steamers. It is played by two or four persons, each side using four circular pieces of iron, which are slid along the length of a board or on the deck, as the case may be. In the indoor game a sand-sprinkled board thirty feet long and with raised edges is used. Lines are drawn across the board five inches from each end, one being the starting and the other the finishing line. The players slide the pieces in rotation. If a piece is left projecting over the edge of the board three points are counted for the player. If it rests between the finishing line and the edge, or on the line, two points are counted. If no piece is inside the line the one nearest to it scores one. A side first making twenty-one points wins. The players change ends following every round.



SHUFFLEBOARD

The accompanying diagram shows the method of marking the deck when the game is played on shipboard. The players stand nine or ten paces away, and in rotation push the pieces (wooden weights) along the deck with a long staff having a curved end. No scores are counted until the end of a round, as the weights may be knocked out by an opponent or pushed into a better position by

a partner. If a piece rests in a semicircular place ten is taken from the score; those resting on the numbered squares give the player a score corresponding to the numbers. The game is exactly fifty points, and if the score is higher than fifty the excess is deducted from the total.



SIAM, *si'am*, popularly known as the LAND OF THE WHITE ELEPHANT, is the only independent kingdom of the Indo-Chinese peninsula. It is called by the natives *Muang Thai*, or the *Kingdom of the Free*. Except on the south, which borders the Gulf of Siam, the greater part of the country is enclosed by the English province of Burma, on the west and northwest, and the French territory of Anam, on the northeast and east. Lower Siam is a long, narrow strip of land extending down into the Malay Peninsula as far as the Federated Malay States. The total area of the kingdom, including Lower Siam, which is about equal to that of the state of Pennsylvania, is 195,000 square miles, almost four times that of the state of New York.

The People. In 1910 the first full statistics of the population were obtained, the total number of inhabitants being 8,149,487, about 400,000 fewer than in the state of Pennsylvania in 1916. Many Laotian peoples live in the northern part of the kingdom, and Shan, Karen and Kamoo tribes dwell in the uplands. Many more northern Asiatics, chiefly the Chinese, who are the business men of the nation, live in the cities. One-third of the population of Bangkok is Chinese. This beautiful green and gold city, called the "Venice of the East," is the capital and largest city of the kingdom, its population in 1914 being estimated at 628,675.

The typical Siamese is indolent, lighthearted, submissive and hospitable. He is of Mongolian stock, of medium height, olive complexion, fairer than the Malay but having similar flat, ugly features. There is no great distinction of caste such as exists among the neighboring Indian peoples.

Religion. The Siamese are very orthodox Buddhists, and their country is often called the Land of the Yellow Robe, referring to the gown worn by the Buddhist priests. All educated Siamese men at some time serve as teachers of this religion. Since India and Burma have been ruled by Great Britain, the King of Siam is recognized as the protector of the Buddhist faith. The natives observe many peculiar customs and ceremonies. Their regard for the sacred white elephant has played a prominent part in their history and government, and this accounts for the popular name of the country. The national flag bears a white elephant upon a scarlet ground. It is believed that the soul of some great king or potentate, possibly even that of Buddha himself, is embodied in the white elephant. These animals are, therefore, considered priceless. They are provided for by the king, and their possession is considered auspicious to his reign. There are countless sacred legends concerning the white elephant, among them being the story that Buddha's mother in a vision saw Buddha embodied in a white elephant; another, that one of the seven gifts to the infant Buddha was—

". . . . . a snow white elephant,
The Haste-Katna, born to bear his king."

The temples, of which there are over 7,140, noted for their beauty and rich decoration, all bear the image of the elephant.

Besides the Buddhists, there are many followers of Mohammed and Confucius, and though the number of Christian converts is comparatively few, the remarkable advance of Siam in its intercourse with other nations is due to Christian missionaries.

Education. Much of the education is in the hands of Buddhist priests. All of the royal monasteries, government schools, hospitals and a Pasteur Institute are in charge of the Minister of Public Instruction. In Bangkok in 1914 there were 142 elementary, two secondary and six English schools and a civil service college.

A university with eight departments is being established.

The Country and the Climate. Entrance into Siam is usually made through the harbor at Bangkok, the wide mouth of the Menam River. This great waterway flows through central Siam in a southwesterly direction, and to its annual overflow the fertility of its great valley is due. Almost as much as in Egypt, the welfare of millions depends upon flooding by the country's great river. The Ban-Pa Kong and the Mekong are other important streams of the rich lands of the central section. This is the region of open grass and rice lands, swamps, reed and bamboo jungles. As one journeys up the Menam River, the country grows more hilly. Covered with dense forests of teakwood, the hills rise to steep mountains in the extreme north. The Mekong, the largest of all the rivers of Indo-China, drains this northern region. Lower Siam is mountainous and wooded. The rivers are small and shallow, and the coast is ragged and studded with islands.

LOCATION MAP

The small black area in Southeastern Asia makes clear the relative sizes of Siam and the other Asiatic countries.

Although the climate is tropical and its great humidity is enervating and unhealthful for Europeans, it has not the extreme heat of India. In the dry season, lasting from October until May, after the hot, glittering sunlight of the day, cool nights descend with amazing suddenness, "for there is no twilight within the courts of the sun." During the wet season, the excessive heat is made more intolerable by the great humidity. The rainfall is heavier in some sections than in others, but averages 240 inches a year.

Industries. Practically the whole population of Central Siam, outside of Bangkok, is occupied in the growing of rice, of which there are forty or fifty varieties. The method of cultivation is very primitive, but effective, and Siamese unhusked rice is of the best in the world. It is the national food and the chief export. During the year 1914 the export amounted to 1,176,980 tons. Many fruits are abundant, including the mango and mangosteen. Large tracts of waste lands have been recently reclaimed by an irrigation company, and pepper, tobacco, hemp, maize, coffee and cotton are grown. Next to the production of rice, the gathering of teakwood in Northern Siam is the most important industry. It is controlled by the Forest Department, which consists chiefly of British officials. In the year 1914, the export of teakwood was 51,236 tons. Foreign trade is carried on chiefly with Great Britain, India and China.

Siam's mineral resources are varied, but with the exception of the mining of tin in Lower Siam they are not extensively developed. Gold, zinc, antimony and coal are found in some of the provinces. Gold and silver handwork, rice mill, saw mill and pottery products are the only manufactured goods of Siam.

Transportation and Communication. Modern means of transportation are replacing the elephant, coolie and oxcart as burden carriers. In January, 1916, there were 895 miles of railroads in Siam. In the year 1915, about 1,950 vessels entered the port of Bangkok. In 1909 a Siamese company established a line between Bangkok and Chinese ports in competition with the North German Lloyd Orient Line. In the interior the rivers are important commercial highways. Mail is delivered through 255 offices and agencies, and a parcel post service has been established. In 1915 there were sixty-seven telegraph offices, two telephone exchanges and two wireless stations.

Government. With the exception of China and Japan, Siam is the only independent government of Eastern Asia. Many European and American ideas have been introduced by the American, British, French and Japanese advisers of the king. The government is an absolute monarchy, and the Crown usually hereditary, the king having the right to appoint his successor. A legislative council of forty members shares the power of making laws with the king and his cabinet, composed of the ministers of the several departments. The kingdom is divided into seventeen *monthons*, or districts, ruled by high commissioners under the king. Several tributary districts are under their own chieftains. Since 1892 justice has been dispensed by organized courts with qualified judges appointed by the ruler.

History. Much of the early history of Siam is filled with fable. No coherent account of events previous to 1350 is obtainable. That date marks the founding of the city of Ayuthia as the capital and the accession of the first true Siamese king. The acquaintance of the Chris-

tian world with Siam dates from the early sixteenth century, when Portuguese traders established intercourse with the country. In the seventeenth century, commercial relations with the Dutch and English were established. During this period Siam was almost continually fighting neighboring tribes to maintain its independence, and in 1767 Ayuthia was taken by Burma. After some years the kingdom regained its independence and established the capital at Bangkok.

A new era of Siamese history began in 1854, when treaties were made with Great Britain and the United States which placed Siam in the van of that great movement by which the Orient abandoned its policy of seclusion and started upon a new course of progress and development. At that time Siam was opened to the trade of all nations.

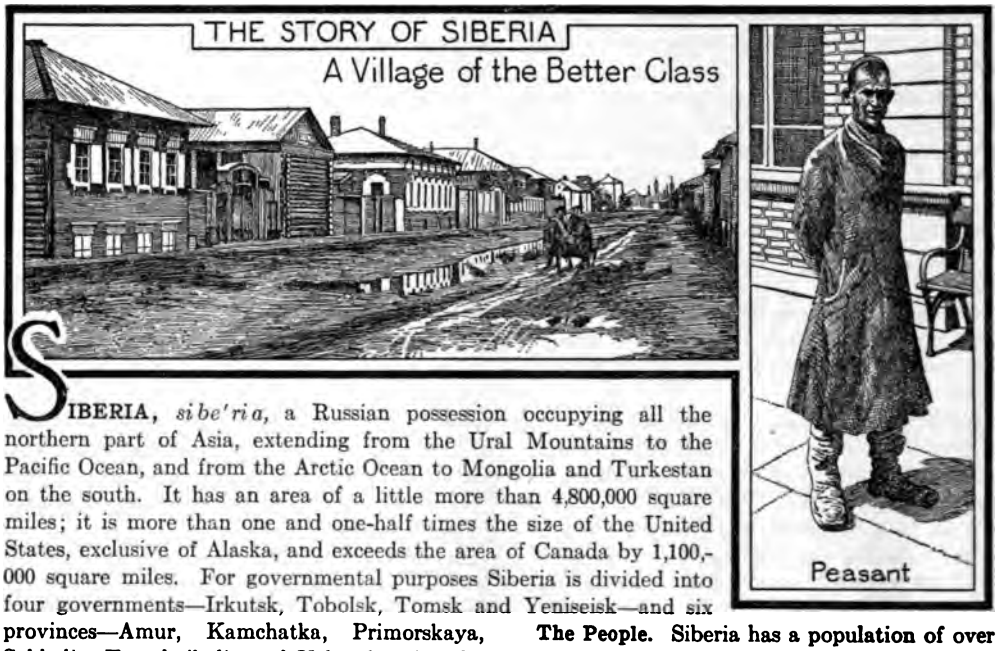
The limits of the kingdom have varied at different periods in its history. In 1891 the boundary between Burma and Siam was settled by treaty with England. In 1904, in an Anglo-French agreement, this boundary was confirmed and the provinces of Luang Prabang, Maluprey and Bakak, west of the Mekong, were acknowledged to belong to France. In 1907 more territory in Eastern Siam was ceded to France, and tracts in the Laos territory and on the south coast were returned to Siam. The kingdom was reduced to its present limits in 1909, when the tributary states of Kelantan, Trengganu and Kedah, with a total area of about 15,000 square miles, were ceded to Great Britain.

In recent years, resulting from the introduction of Western civilization, many reforms in the government have been made. Slavery was abolished in 1905, and a new penal code has been in force since 1908. The present king succeeded to the throne in December, 1911, and has been following the enlightened and liberal policy of the administrations of his father and grandfather, inviting the commerce, science and even religion of the Western world. In July, 1917, Siam issued a statement declaring that a state of war existed with Germany and Austria. The government seized nine vessels of the Germanic powers and ordered the arrest of all alien enemies in the kingdom. E.B.P.

Consult Vincent's *The Land of the White Elephant;* Whitney's *Jungle Trails and Jungle People.*

Related Subjects. The reader who is interested in Siam may consult the following articles in these volumes:

Bangkok	Mekong River
Buddhism	Rice
Elephant	Teak



SIBERIA, *si be'ri a,* a Russian possession occupying all the northern part of Asia, extending from the Ural Mountains to the Pacific Ocean, and from the Arctic Ocean to Mongolia and Turkestan on the south. It has an area of a little more than 4,800,000 square miles; it is more than one and one-half times the size of the United States, exclusive of Alaska, and exceeds the area of Canada by 1,100,000 square miles. For governmental purposes Siberia is divided into four governments—Irkutsk, Tobolsk, Tomsk and Yeniseisk—and six provinces—Amur, Kamchatka, Primorskaya, Sakhalin, Transbaikalia and Yakutsk. For the government of these provinces see RUSSIA.

The People. Siberia has a population of over 10,000,000. The two most populous governments are Tomsk, with nearly 4,000,000 in-

habitants, and Tobolsk, with over 2,000,000. About sixty-one per cent of the people are Russians. There are about 8,000 Jews and a few Germans. The remainder of the population consists of native tribes. The northwestern section is the home of a large number of Samoyeds, a people closely related to the Finns. There is a wide difference in language and racial characteristics between the native peoples of the eastern and western parts of the country. Many Chinese are found in the region bordering on Mongolia. The exile system (see EXILE) banished to Siberia, for political reasons, many of the ablest and most highly educated men and women of Russia, and they have contributed no small share to the advancement of the Siberian colonies.

The uneducated Russians and the natives are nonprogressive, with little ambition. To the ordinary observer they seem merely to exist, exerting themselves only to procure the food, clothing and shelter for their daily needs. It is thought by some that this condition is due largely to the stupefying effect of the long, cold winters.

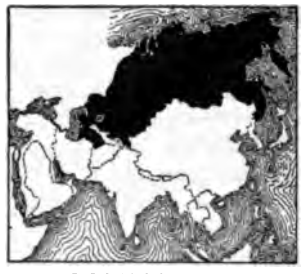
Surface and Drainage. The entire country is a great plain sloping gently towards the Arctic Ocean, into which all the rivers flow. The western part of Siberia is low and practically level. The Altai and Yablonoi mountains lie on the southern border, and the Stanovoi Mountains extend across the eastern end of the country to Bering Sea, with a spur extending into Kamchatka.

Amur province and the eastern part of the country are rolling and hilly, but the western part merges imperceptibly into the low tundra (treeless plains) that extends to the ocean.

Rivers and Lakes. Siberia is a land of great rivers. No other country except Brazil has such a large number of navigable streams, but the long winters render them almost useless for commercial purposes. From west to east the important rivers are the Ob, or Obi, whose largest tributary is the Irtish; the Yenisei, rising in Mongolia, and the Lena, known for its extensive delta. The Amur drains the extreme southeastern section into the Sea of Okhotsk.

Lake Baikal, with an area of 13,200 square miles, is the largest lake in Siberia and the largest fresh-water lake in Asia. The other lakes are unimportant. The tundra consists chiefly of marshes.

Climate. Siberia is known for its long, cold winters and short, hot summers. Central Siberia is considered to have the coldest climate of any region in the world, the mean temperature for January being 56° F. below zero, and the maximum cold being 90° to 93° below. Not even at the North Pole does the temperature fall so low. A dry atmosphere renders the severe temperature somewhat more tolerable than it would otherwise be. The rivers remain frozen nine months in the year. The frost penetrates to such a depth that the subsoil remains frozen throughout the year; the sudden thawing of the ground in the spring turns the country into an impassable marsh. The mean summer temperature varies from 62° to 65°, but the many hours of sunlight contribute to the rapid growth of vegetation. Excepting along the Pacific coast the rainfall is light, but the constant thawing of the subsoil supplies vegetation with moisture.



LOCATION MAP

Siberia, the area in black, is by far the largest political division of the Asiatic continent.

Plants and Animals. The northern sections of the tundra are covered with mosses and lichens, among which are a few scattering shrubs. On the southern border of the tundra the trees characteristic of sub-Arctic forests—the silver fir, the larch and the birch—are found. This sub-Arctic belt merges into the great forest of spruce, pine and hardwood trees that extends from the Ural Mountains to the Pacific coast, being interrupted only by rivers, marshes and peat bogs.

Animals. Siberia is the chief fur-producing country of the world, although some of the most valuable fur-bearing animals have been nearly exterminated by hunters. More than 1,000,000 squirrel skins are taken from the country every year. Other animals whose furs are a source of wealth are the fox, the otter, the sable, the polar hare, the wolf, the bear and the ermine. The tiger is occasionally found in the southeast, and burrowing animals abound throughout the southern part of the country. The reindeer is native in the north, where it feeds upon the mosses and lichens of the tundra. It is indispensable to the inhabitants of these inhospitable regions. The lakes and streams abound in fish.

Minerals and Mining. Siberia is rich in minerals, but owing to meager transportation

facilities and antiquated methods the mineral industry has made but little progress. About two-thirds of the gold produced in Russia comes from the mines in Eastern Siberia. Silver is also mined in the same locality, and the annual output of both metals amounts to about $21,000,000. The opening of the Trans-Siberian Railway created a demand for coal, and about 1,800,000 tons are mined annually. There are valuable deposits of copper, iron, lead, graphite and other minerals awaiting development.

Agriculture. The agricultural region includes the southern part of the country, and in the west extends northward to the 55th and 60th parallels. The black-earth region of Southeastern Russia extends into the southwestern part of Siberia, where it is devoted almost exclusively to the raising of wheat. The western part of the country constitutes the chief agricultural region, and nine-tenths of the inhabitants are engaged in tilling the soil. Wheat, oats, rye and barley are the principal crops. Of these the wheat crop is the most important. Vegetables and fruits common to a cool temperate climate are grown in sufficient quantities to supply the local demand. In many localities raising live stock and dairying are fast becoming prominent sources of revenue to the farmers.

Nearly all the land is held by the government and rented to the peasants, who live in communes, or small administrative districts. American machinery, implements and methods, however, have been introduced, and are rapidly displacing the old method of tillage and harvesting.

Manufactures. Tomsk is the chief manufacturing center, and has a number of large factories and mills. Flour, sugar, ironware, carpets and porcelain are its most important manufactures. The making of clothing, furniture and household utensils is carried on in the homes, or in small shops, although the opening of the Trans-Siberian Railway lessened these industries to some extent, because it provided a means for the importation of manufactured goods from Russia. On the other hand, the railway stimulated manufactures in the larger towns, because of increased facilities for transporting machinery and raw material. Manufactures are increasing all along the line of the railway and in the eastern provinces. The chief hindrances are lack of fuel and scarcity of skilled workmen.

Transportation and Commerce. Siberia has over 30,000 miles of navigable rivers, but they are icebound nine months of the year. Nevertheless, some of them are important waterways during the time they are open to navigation. The Ob and its tributaries, which furnish 9,000 miles of navigable streams in the most fertile district of the country, constitute the most important inland waterway. The Yenisei is navigable for 1,850 miles and is the connecting link between Lake Baikal and the trade centers on the Ob, to which it is joined by a canal. Tiumen is the most important of these centers, since at this point connection is made with the railway for Petrograd and Moscow. The Lena serves a local trade, and the Amur and its tributaries furnish over 8,000 miles of waterways to the southeastern part of the country.

COMPARATIVE AREAS

Siberia is more than one and a half times the size of the United States.

The Trans-Siberian Railway connects Vladivostok with Moscow and Petrograd, and is the most important commercial route of the country. A branch extends southward to Port Arthur, Tientsin and other important cities in China. The opening of this railway was a great incentive to the agricultural and manufacturing interests of the country. To it flows the traffic of all the great rivers, and numerous commercial and industrial centers have been developed along the line. Caravan routes, over which goods are transported on the backs of camels and horses, lead from the principal Siberian cities to the leading cities of Manchuria and Mongolia. Irkutsk is an important trade center because it is the meeting point of several of these routes and the Trans-Siberian Railway.

The foreign commerce is carried on chiefly with European Russia, China and the United States. The annual trade with the United States amounts to about $50,000,000, most of which passes through Vladivostok.

Education. Education is backward, and there are but few elementary schools in proportion

to the population. In 1916 fewer than 400,000 pupils were enroled in all the educational institutions in the country. The university at Tomsk has about 1,400 students, and since 1912 the Tomsk House of Science, or People's University, has been open, with free instruction. The opening of this institution marked an important step in the progress of education.

Government. Since Siberia is a dependency of Russia, it is under the same system of government as that country.

History. Siberia became a Russian possession in 1581-1582, when a band of Cossacks took the town of Sibir (Isker), on the Irtish River. In 1618 Yeniseisk was founded, and became an important center of trade between Siberia and Europe. By the end of the seventeenth century the entire country, excepting the territory of Amur, had become a Russian possession, and this was acquired from China in 1858. The opening of the Trans-Siberian Railway led to more rapid development of the country, and its importance was emphasized by the Russo-Japanese War in 1905, and again in 1914, when the War of the Nations began. When Russia deposed the czar in 1917 thousands of Siberian exiles returned to the homeland and took a prominent part in the reorganization of the government. As was inevitable, in many parts of Siberia lawless rioting followed the sudden gift of freedom, for which, after centuries of despotism, the people were unprepared. W.F.R.

Consult Fraser's *The Real Siberia;* Wright and Digby's *Through Siberia.*

Related Subjects. The following articles in these volumes will be of interest in connection with the study of Siberia:

CITIES	
Irkutsk	Tobolsk
Omsk	Vladivostok
LAKES	
Aral	Baikal
MOUNTAINS	
Altai	Ural
Stanovoi	Yablonoi
RIVERS	
Amur	Syr-Darya
Lena	Yenisei
Ob	
UNCLASSIFIED	
Fur and Fur Trade	Russia
Kamchatka	Trans-Siberian Railway
Reindeer	Tundra

SIBYL, *sib'il,* in Greek and Roman mythology, a prophetess who owed her divine gift to Apollo. The most famous was the *Cumaean sibyl,* who, so the story goes, appeared before King Tarquin the Proud and offered him nine books for sale. This offer he refused, and a second offer, after she had destroyed three books, was also declined. When she appeared before him the third time, with but three books left, he bought them, paying the price she had asked for the nine. These three books were kept in the temple of Jupiter, and when it was burned in 83 B.C. they were likewise destroyed. A collection of sibylline verses was then assembled from the cities of Greece, Italy and Asia Minor, and deposited in the new Temple of Jupiter Capitolinus. The sibylline literature was consulted when it was deemed necessary to conciliate the gods.

SICILIES, *sis'i lis,* KINGDOM OF THE TWO, a former kingdom of Italy, comprising Naples, or Southern Italy, and the island of Sicily. The name Kingdom of Naples was also often used. The island and the lower part of the mainland had much the same history from the earliest times; both came successively under Greek, Roman, Ostrogoth and Saracen domination, and about the middle of the eleventh century both were invaded by the sons of the Norman knight, Tancred. Robert, the elder, made conquests in Southern Italy, and Roger gained possession of Sicily; and under Roger II, son and successor of Roger I, further gains were made on the mainland, and the two dominions were united and called the Kingdom of the Two Sicilies. Roger II left no male heir, and through his daughter, the wife of Emperor Henry VI, the kingdom came under the dominion of the Hohenstaufen.

This House was overthrown in 1266, and the Two Sicilies fell to Charles of Anjou, brother of Louis IX of France. The rule of Charles was most oppressive, and in 1282, by means of the so-called Sicilian Vespers, Sicily threw off the yoke of the family of Anjou and became subject to Pedro III of Aragon. Thus the two parts of the kingdom were separated, and though they were reunited for a few years after 1442, they were again divided and remained so until early in the sixteenth century, when they came under the domination of Spain. Spanish rule was cruelly severe, and insurrections were frequent.

In 1707 Austria succeeded in gaining possession of Naples, by the War of the Spanish Succession, while Sicily was given to Savoy; but in 1720 Savoy gave up Sicily to Austria, receiving in exchange Sardinia. Fourteen years later Don Carlos, son of Philip V of Spain,

by a successful invasion made himself king of the Two Sicilies, thus inaugurating the reign of the Bourbon family. When the French Revolution broke out, and French armies began to overrun Europe, Ferdinand, king of the Two Sicilies, joined the coalition against France, and was for a time deprived of the mainland part of his kingdom; reinstated, he again lost Naples, this time to Napoleon, who placed on the throne first his brother Joseph and, later, Joachim Murat. After Napoleon's downfall the two parts of the kingdom were reunited.

Various revolts occurred in the succeeding decades, but Austria forbade any concession on the part of the sovereigns to the people's demand for liberal government. Francis I, Ferdinand II and Francis II did not need the backing of Austria to make them despotic, and their continued cruelties prepared the people to welcome the advent of Garibaldi and his forces, through whose efforts they were freed and made a part of the new kingdom of Italy, as is related in the article ITALY. A.MC C.

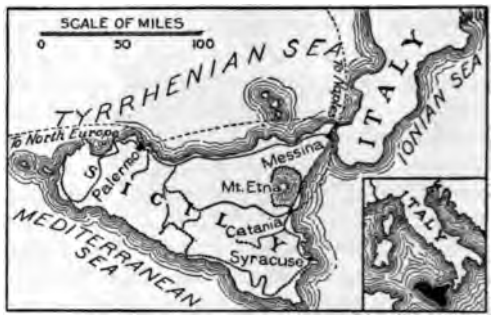
Consult Freeman's *History of Sicily from Earliest Times.*

Related Subjects. The following articles in these volumes will make clear certain references in the above discussion and will give added information:

Ferdinand II and IV	Naples
Garibaldi, Giuseppe	Sicily
Hohenstaufen	Succession Wars
Italy, subtitle *History*	Tancred

SICILY, *sis'i li,* a mountainous island in the Mediterranean Sea, separated from the mainland of Italy, of which it is politically a part, by the Strait of Messina. An examination of the accompanying map will show that Sicily lies opposite the toe of the "boot," and that it is an irregular triangle in shape. This island, with an area of 9,935 square miles, is the largest in the Mediterranean, and is nearly three times the size of Porto Rico. In 1911 it had a population of 3,672,258. In past geologic ages it was a part of the mainland, and, like the Italian peninsula, it has a chain of mountains extending through it. Beautiful Mount Etna, which rises near the eastern coast to a height of 10,750 feet, is the loftiest peak on the island—like Mount Vesuvius, a perpetual reminder of the uncertainty of life. There are no rivers of commercial importance and few lakes, but mineral springs occur in many places. Sicily has a fairly even climate, though the sirocco, with its burning heat, sometimes visits the island.

The mountain slopes and foothills are covered with lemon, orange and olive groves and with vineyards, and on the flat table-lands cereals are raised, but Sicily has lost its name of "the granary of Italy," because the yield of cereals is sufficient only for the needs of the people of the island. Deep-sea fishing furnishes tunny fish, sardines, coral and sponges, and great quantities of sulphur are mined. Sulphur, fruits, vegetables, salt, wine, oil and



LOCATION MAP

The small corner map shows the geographical position of the island with respect to the peninsula of Italy.

fish are the chief exports. The three chief ports are Palermo, Catania and Messina. The people are for the most part illiterate and very poor, although there are a few wealthy landowners. In the mountain fastnesses a few picturesque brigands still survive.

Situated as it is between Europe and Africa, the island has been a battle field for the two continents. The first settlers in Sicily, probably invaders from Italy, were conquered by the Greeks, who founded colonies—Naxos, Syracuse, Agrigentum and others—and introduced Greek culture into the island. The traveler in Sicily to-day finds everywhere traces of that Greek civilization—the crumbling ruins of temples and tombs with their sculptured marbles and friezes. As each of three great empires of antiquity grew into power, Phoenicia, Carthage and Rome, it included Sicily in its conquests. The Goths and Vandals, barbarian hordes from the north, drove the Romans out of Sicily, to be themselves driven out when Belisarius conquered the island and annexed it to the Byzantine Empire. Byzantine rule was replaced by Saracen and that in turn by Norman. For a continuation of the history of Sicily, see SICILIES, KINGDOM OF THE TWO. B.M.W.

Consult Crawford's *Southern Italy and Sicily, and Rules of the South.*

Related Subjects. The following articles in these volumes will furnish additional information:

Catania	Palermo
Etna	Sirocco
Messina	Sulphur

SICKLE, *sik''l,* a reaping implement, having a short handle with a curved blade of steel, the edge of the blade being in the hollow, or inner, side of the curve. The sickle is the oldest of reaping instruments, and is still in use for gathering crops in some countries. In America it is now mainly used for trimming the edges of lawns, where a scythe or mower cannot be used. In using the sickle the workman grasps the handle in the right hand and holds with the left as much grass as the implement can cut with one stroke. For general use in the harvest the sickle gave way to the cradle, which in turn was superseded by the mowing and reaping machines. See SCYTHE.

SIDDONS, *sid'unz,* SARAH KEMBLE (1755-1831), the most famous English actress of her time, was born in the "Shoulder-of-Mutton" inn at Brecon, Wales. Her professional life began so early that she herself declared it was impossible to remember the time when she was not on the stage. When eighteen years old she married an actor, William Siddons, and the couple played in various country towns. Her first triumph occurred at Cheltenham, England, in 1774. Some members of the nobility there attended her performance of Belvidera in Otway's *Venice Preserved* with the avowed purpose of ridiculing her, but instead, they applauded. They praised her to David Garrick, the actor and manager of Drury Lane theater, London, and he engaged her to act for him at twenty-four dollars a week. She was unsuccessful, and in 1777, returned to the theaters of the rural towns.

After five years of earnest work, she was invited to return to Drury Lane, where her appearance in October, 1782, as Isabella in Southerne's *Fatal Marriage* gave her one of the greatest triumphs ever seen in a British theater. Mrs. Siddons afterwards acted many famous classic rôles, such as Desdemona, Ophelia and Queen Catherine in Shakespeare's *Henry VIII,* but the nearest she ever approached to the power of her Lady Macbeth was as Volumnia in Kemble's *Coriolanus.*

She died in London on June 8, 1813, and was buried in Paddington Churchyard in that city.

SIDEREAL, *si de'ri al,* **TIME,** time measured by the apparent motion of the stars. In reality a *sidereal day* is the exact time taken by the earth in revolving once on its own axis. This time is equal to that between the passage of any particular star across the meridian and the beginning of its next passage, amounting to 23 hours, 56 minutes, 4.8 seconds. A *sidereal year* is the period in which the earth revolves once around the sun, or in which a star apparently completes its revolution, returning to the same place in the heavens. The length of the sidereal year is 365 days, 6 hours, 9 minutes, 9 seconds.

Related Subjects. The reader is referred to the following articles in these volumes:

Chronology	Earth
Day	Time

SIDNEY, *sid'ni,* SIR PHILIP (1554-1586), an accomplished British courtier, poet and soldier who was a popular idol during part of the reign of Queen Elizabeth. Being the nephew of Dudley, Earl of Leicester, his career at court was assured, and he was most favorably received by the queen, who employed him in important missions. Offending her, however, by his outspoken objection to her proposed marriage with Henry, Duke of Anjou, Sidney was compelled to retire from the court for a few months, during which he wrote his *Arcadia* and various poems for the entertainment of his sister, the Countess of Pembroke. Elizabeth's anger soon abated; he was restored to favor and forbidden to sail with Sir Francis Drake against the Spaniards, as the queen said she could not spare the "jewel of her dominions."

While serving as governor of Flushing, he was mortally wounded at the battle of Zutphen. As he was being borne off the field he complained of thirst and water was brought to him. Seeing the wistful look on the face of a mortally wounded soldier, Sidney handed over the water, saying simply, "Thy need is greater than mine."

Sidney's death was greatly mourned. His body was taken to England and buried with great ceremony in Saint Paul's Cathedral. His poetry, though full of the extravagant fancies of the time, is of considerable beauty, but he was beloved in life and is now chiefly remembered for his purity of mind and conduct and his near approach to the ideal gentleman.

Consult Addleshaw's *Sir Philip Sidney;* Greville's *Life of Sir Philip Sidney.*

SIDON, *si'dun,* in ancient times one of the leading cities of Phoenicia, situated on the Mediterranean shore twenty-five miles south of Beirut (see colored map, opposite page 417).

At various times it held the supreme place in the Phoenician confederacy, alternating with Tyre in this rôle. Sidon was famed for its purple dyes, and its people, who are mentioned in Homer's writings, were skilled traders and artisans. There is a tradition that they manufactured glass from the fine sand of the Belus River, and Pliny credited them with the discovery of the process. A number of magnificent sarcophagi have been found in the vicinity. The modern town of Saida, a place of about 12,000 people, occupies a portion of the site of the ancient city. See PHOENICIA; TYRE.

SIEGE, *seej,* a word derived from the Latin *sedere,* meaning *to sit.* Literally, a siege consists in stationing an army before a defended place for the purpose of taking it by assault or by starving it into surrender. The first object of the besieging force is to invest or surround the position, to prevent outside help or supplies from reaching the besieged. If time is not of great importance, and submission through starvation is sought, the besieging force may content itself with only such operations as are necessary to repel sorties by the garrison. If there is danger of a relieving force arriving in strength sufficient to give battle to the besiegers, the operations must be more vigorous. Artillery must be placed at important and commanding positions and the attackers must advance to the assault, or from trench to trench dug parallel to the works of the enemy. The digging of the trenches is a difficult and dangerous undertaking and must be carried on under cover of artillery and rifle fire or at night. The besieged, meanwhile, use their utmost endeavors to prevent the nearer approach of the besiegers.

In reducing a city by artillery fire, called *bombardment,* special guns are used, more powerful than those with the army in the field. For siege guns in the United States service modern 7-inch howitzers, mortars and long 5-inch siege guns have been adopted. The 5-inch gun is also much used in Europe when there is not time to bring up heavier guns which cannot possibly travel with the army. The 5-inch guns weigh about 3,660 pounds, are 12.15 feet in length and fire a shell 45 pounds in weight. The big siege guns, used first by the German army in 1914, have an effective range far greater than any previously known siege gun, and practically rendered besieging an unnecessary operation.

Modern Siege Methods. Modern siege tactics have undergone considerable change since the methods adopted by the Japanese proved effective at Port Arthur in the Russo-Japanese War. The heavy guns used by the Germans at the outbreak of the War of the Nations in 1914 have proved that however strong positions may be, and however well protected the forts, the weight of metal will eventually batter down the defenses. In fact, it may be safely stated that sieges, in the old way, will not again be prominent in warfare. What the Japanese accomplished by zigzag trenches, which exposed the least possible space to gunfire, the Germans in Belgium accomplished by bombardment and assault.

An army now caught in any town, however strongly fortified, would be better employed in fighting its way out than in attempting to prevent the enemy getting in. By the constant nearer approach of trenches, by utilizing all natural means of defense and concealment, modern armies accomplish in a week what could hardly be done in months in any previous wars. The modern siege guns, with a range of 12,000 yards (about seven miles), cover the advance of attacking infantry in a way hitherto unheard of in siege tactics.

Famous Sieges. The most famous sieges of the last century are those of Paris in 1871; Plevna, 1877; Mafeking, 1899-1900; Port Arthur, 1904; Przemysl, 1914-1915. In the first stage of the War of the Nations in 1914, the siege of Antwerp was characterized by none of the principles of siegecraft. Weight and numbers and long range of guns rendered it impossible for the besieged to offer strong resistance, and also made it unnecessary for the besiegers to resort to any delaying tactics of gradual approach. Antwerp was taken by the Germans in eleven days, whereas by former siege methods and appliances six months might have been required, if, indeed, success were at all possible, for the fortifications of Antwerp were among the strongest in the world. The Russian siege of Przemysl was stubbornly contested for six months, at the end of which time the Austro-German garrison surrendered. It was the sixth longest siege in history.

The greatest sieges recorded are the following:

1779-81—Gibraltar, three years, seven months, twelve days. Relieved.
1856—Sebastopol, 335 days. Fell.
1857—Delhi, 131 days. Relieved.
1857—Lucknow, 149 days. Relieved.
1862-63—Vicksburg, 186 days. Fell.
1864-65—Richmond, 287 days. Evacuated.
1870—Metz, 134 days. Fell.

1870-71—Paris, 135 days. Fell.
1877—Plevna, 144 days. Fell.
1899-1900—Ladysmith, 120 days. Relieved.
1905—Port Arthur, 241 days. Fell.
1912-13—Adrianople, 155 days. Fell.
1914-15—Przemysl, 185 days. Fell. F.ST.A.

Related Subjects. The reader is referred to the following articles in these volumes:

Antwerp	Port Arthur
Franco-German War	Russo-Japanese War
Lucknow	War of Secession

SIENKIEWICZ, *shen kya' vich,* HENRYK (1842-1916), a Polish novelist, best known as the author of *Quo Vadis,* a vivid story of ancient Rome in the days of Nero. It has been dramatized both for the regular stage and for the moving-picture theaters, and always with telling effect. Sienkiewicz possessed in a remarkable degree the power to visualize historic scenes and characters, and his stories are intensely interesting and powerfully emotional. He was born in the province of Siedlce. After his student days at the University of Warsaw he visited California, writing an account of his journey in a series of letters published in the *Polish Gazette.* His first novel, *The Tatar Bondage,* published in 1880, was a great success, and was followed by a trilogy having as a background the struggle between the Poles and Cossacks. The three books of this series are entitled *With Fire and Sword, The Deluge* and *Pan Michael.* Among his other widely-read novels are *Children of the Soil,* a story of contemporary Polish life, and *Knights of the Cross,* which deals with the conflict between the Poles and the Teutonic Order of Knights. The latter appeared in 1904, and the following year the author received the Nobel prize for literature. When the war in Europe broke out Sienkiewicz devoted most of his time to Polish relief work. He died in Switzerland, while on a mission for his prostrate country.

Consult Phelps's *Essays on Modern Novelists.*

SIERRA LEONE, *se er'a le o'ne,* a British colony on the west coast of Africa, founded in 1791 (after an unsuccessful first attempt in 1787) by a group of English philanthropists as a refuge for fugitive negro slaves (see colored map in the article AFRICA, opposite page 81). It became a Crown colony in 1807. About 30,000 square miles of country east of the colony, populated by pagan negro tribes to the number of about 1,403,000, form a province that is under the protection of Great Britain and is called Sierra Leone Protectorate. The coast colony has an estimated area of 4,000 square miles and a population of 75,572.

The country is hilly, well wooded and well watered, and the coast regions are very unhealthful. There are valuable woods in the forests, chiefly teak, ebony and rosewood, and many wild animals, including elephants, leopards, panthers, monkeys and buffalo; in the rivers are crocodiles and hippopotamuses, and serpents, especially boa constrictors, are numerous. Freetown, the capital, has a population of perhaps 500 Europeans and about 37,200 negroes; the latter represent all tribes and they speak a universal language called "pidgin" English. The principal exports include rubber, palm nuts and oil, ginger and pepper.

SIERRA MADRE, *se er'a mah'dra.* The name is given to a number of mountain ranges in territory that was once Spanish, and also to a range in Spain. The best known are in Mexico and the Philippines. In Mexico there are the Western (Occidental) Sierra Madre and the Eastern (Oriental) Sierra Madre, the two ranges which border the great plateau. The Oriental range is a part of the Rocky Mountains system; it is lower than the Occidental, and less rugged.

SIERRA NEVADA, *se er'a ne vah'da,* a chain of mountains in Southern Spain, extending from the province of Granada into the province of Almeria, a distance of about sixty miles. They lie south of the Guadalquivir valley, twenty-eight miles from the Mediterranean. The Sierra Nevadas are so named because many of the peaks are over 10,000 feet high, and are covered with perpetual snow; the name is the Spanish for *snowy range.* Mulhacén, 11,420 feet high, is the loftiest peak in Spain. The mountains rise abruptly from the plain, and at their base are orchards of olives, chestnuts and oranges, but the slopes are almost entirely bare rock.

SIERRA NEVADA, the highest and steepest mountain range in the United States, extending north and south for more than 400 miles through Eastern California. To the west of the range are the valleys of the Sacramento and San Joaquin rivers, and to the east lies the Great American Basin. The highest peak in the United States proper, Mount Whitney (14,448 feet), belongs to the Sierra Nevada range, and there are many others more than 10,000 feet above the sea. Among the places in the Sierra Nevada famous for beautiful scenery is the Yosemite Valley (see YOSEMITE NATIONAL PARK). A more extended description of the mountains may be found in these volumes in the article CALIFORNIA (see page 1057).

SIEYÈS, *sya yes'*, EMMANUEL JOSEPH (1748-1836), a French revolutionist, born at Fréjus. He was educated at the University of Paris, and prepared himself for the priesthood. In 1775 he was appointed a canon in Brittany and rose rapidly to the post of vicar-general. He was in Paris in 1789 and at that time took a most active part in furthering the French Revolution. On June 16, as a member of the States-General, he proposed that that body form itself into an organization to be called the National Assembly; this was done, and Sieyès was chosen its president in 1790. In the next year many violent leaders, among them Danton, Robespierre and Saint-Just, went to such extremes in their harsh methods of government that his conscience would not permit him to follow them, and he became almost a silent member of the Assembly, simply recording his vote in important matters.

After the close of the Reign of Terror, Sieyès did important work in the department of foreign affairs, and in 1798 went as ambassador to Berlin, where he inspired much confidence in the Prussian court. In 1799 he was elected a member of the Directory of Paris, and greatly aided the movement for peace by closing the Jacobin Club (see JACOBINS). On November 9, 1799, he formed what was called a consulate, of which he and Napoleon were members. No man, however, could oppose the will of Bonaparte, and after a few disagreements Sieyès retired from the consulate with a gift of $120,000, an estate, a seat in the Senate and the title of Count of the Empire.

His famous book, *The Exposition of the Rights of Man and of the Citizen,* is a clear and precise statement of man's relations to man, and undoubtedly influenced Jefferson and other American political thinkers at the time the United States Constitution was being constructed.

SIFTON, the family name of two brothers who distinguished themselves in Canadian affairs.

Arthur Lewis Sifton (1858-), a Canadian statesman and jurist, first chief justice and later premier of the province of Alberta. Sifton was born at Saint John's, Ont., and was educated at Wesley College (Winnipeg) and at Victoria University (at Cobourg). After leaving the university he went to the Northwest, where he was admitted to the bar in 1883. From 1899 to 1903 he was a Liberal member of the assembly of the North West Territories, and for the last two years of the period was also commissioner of public works in the Haultain administration. He was then for two years chief justice of the supreme court of the North West Territories, and from 1905 to 1910 was chief justice of Alberta. In 1910 he became premier of Alberta, in succession to Alexander C. Rutherford. Sifton's administration was concerned chiefly with railroad matters, particularly the subsidies, in one form or another, which had been and were to be granted.

Sir Clifford Sifton (1861-), a Canadian statesman, who, as Minister of the Interior in the Laurier Ministry, framed the policy of advertisement and exploitation of the northwest which resulted in a flood of immigration unprecedented in Canadian history. Like his elder brother, Arthur (which see), Sir Clifford was born in Ontario, and attended Victoria University, from which he was graduated in 1880. He removed to Manitoba, was called to the bar in 1882, and for a number of years practiced at Brandon. From 1888 to 1896 he was a Liberal member of the Manitoba assembly, and from 1891 to 1896 was also attorney-general in the Thomas Greenway administration. As attorney-general he carried through the act codifying civil procedure in the province. He was a conspicuous opponent of the Dominion government's policy in attempting to establish separate schools in Manitoba.

In 1896 he entered the field of Dominion politics as Liberal member of the House of Commons and Minister of the Interior and Superintendent of Indian Affairs. Two years later he introduced and carried a measure granting responsible government to the North West Territories. He also hit on the simple plan of advertising the Territories in order to draw immigrants. In 1905 he resigned from the Ministry because he and Sir Wilfrid Laurier could not agree on certain educational questions affecting the Territories. In 1909 he was appointed chairman of the Canadian Conservation Commission, an office which he has made one of the most important outside the Ministry in Canada. He was created a Knight Commander of the Order of Saint Michael and Saint George (K.C.M.G.) in 1915. W.F.Z.

SIGISMUND, *sij'is mund* (about 1368-1437), Holy Roman Emperor from 1411 to 1437. He was the son of Charles IV, and was married to Mary of Hungary, on the death of whose father in 1387 he became king of Hungary. In a campaign against the Turks in 1396 he was utterly defeated, and five years later a popular insurrection drove him from the throne. He re-

gained his power by the aid of hired troops, and after that time seems to have encountered no effective opposition.

As Holy Roman Emperor he convened the Council of Constance, to put an end to the Hussite controversy; and his desertion of John Huss, whom he had promised to protect, is a stain on his memory. From 1419 to 1436 he was engaged in a terrific struggle in Bohemia, which was finally terminated by the acknowledgment of Sigismund as king of that country.

SIGNAL CORPS, *kohr,* a branch of the army which has been called the eyes and nerves of the service. In the early days of the American War of Secession (1861-1865) the members of the signal corps were derisively referred to as "flag-floppers"—a term changed only a little later from derision to respect and admiration. In modern warfare an army without its signal corps simply could not exist; with expert signalers, an army or armies occupying a front extended over 150 miles of territory may be made to maneuver as one man. The members of the Signal Corps are experts in every known means of communication, by day or by night, by the flicker of a match visible only at a few yards, by the use of flags, by the heliograph or by wireless telegraphy, across oceans and continents. By far the most modern aid to armies is the military aircraft.

Signaling by Aircraft. At the commencement of the War of the Nations, in August, 1914, all the world wondered what part would be played in the war by aeroplanes and other aircraft. It was soon discovered that as aids to the armies the importance of the aerial forces cannot be overestimated. For scouting, ascertaining and reporting the position and strength of the enemy and the disposition of his artillery, the signalers of the air have proved invaluable. At long ranges, the guns of the enemy are invisible, and only by the signals from the daring air scouts can the correct range be found. While bombs may be thrown from aircraft and inflict damage, the greatest efficiency of the aerial forces lies in their coöperation by signal with the artillery and the army generally. The daring of the air signalers of all nationalities engaged in the war was remarkable. The appearance of an aeroplane was the signal for bombardment. Yet day after day the signalers returned to their duty, even engaging themselves in deadly battles several thousand feet above the earth, sacrificing their lives in the endeavor to give their friends below the much-needed signals.

The history of the signal corps of the United States army dates from 1860, when Major Albert J. Myer was appointed chief signal officer. In 1863 the Signal Corps became a separate and complete organization, efficient in land and naval service. After being for a time attached to the Weather Bureau, the Corps was again reorganized in 1891, with William B. Hazen at its head, when it consisted of ten commissioned officers and fifty enlisted men ranking as sergeants. To Hazen much credit must be given for bringing the corps to its present efficient state. F.ST.A.

Related Subjects. The reader is referred to the following articles in these volumes:

Army	Navy
Flag	Telegraph, subtitle
Flying Machine	*Wireless Telegraph*
Heliograph	Weather Bureau

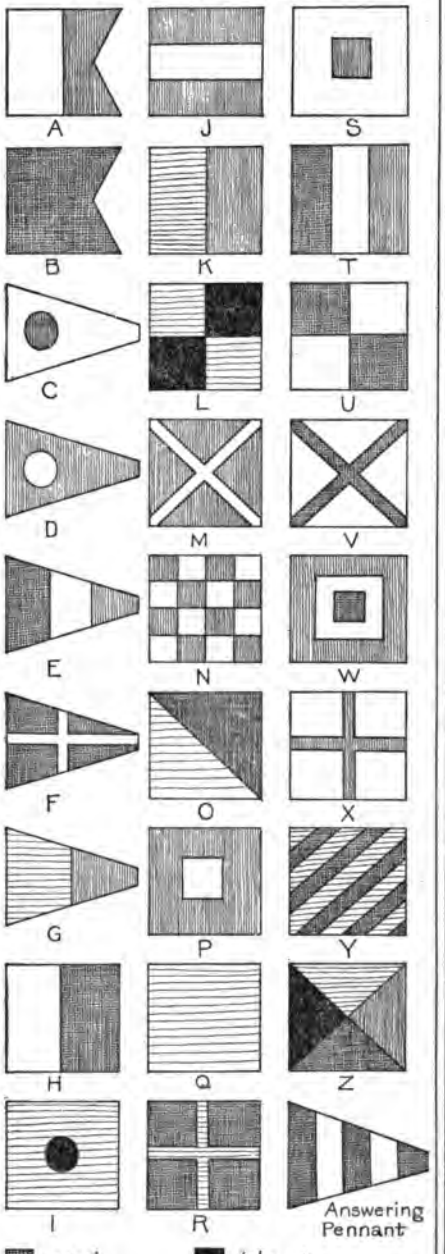
SIG'NALING, the art of conveying messages by means of audible or visible signs to distances beyond the reach of the human voice. The most perfect form of modern signaling is by electricity, and the wireless telegraph has revolutionized the signal systems of the world. Previous to its introduction ships at sea were cut off from the world till they reached port. Now constant communication is maintained, and passengers on board modern liners may be well informed on current events.

Signaling between ships at sea, although now largely by wireless telegraph, is also carried on by flag signals according to an international code, which discloses the meaning of every flag or combination of flags displayed. This code was adopted in 1901, by international agreement. There are twenty-six code flags and an answering pennant to give warning of the hoisting of a flag message, and also to signify that the message is understood.

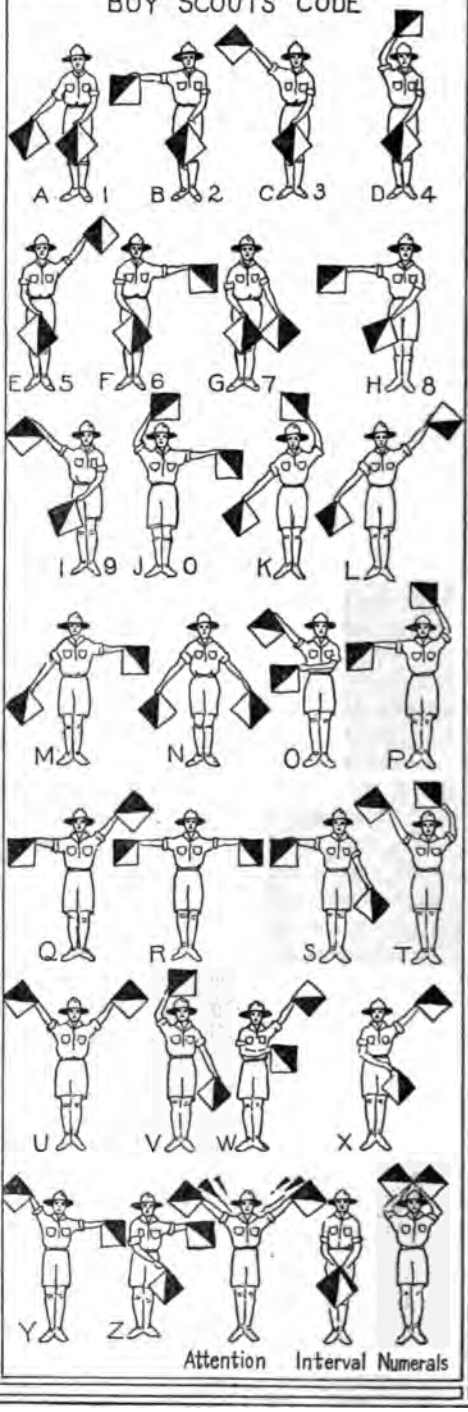
In time of war signaling is of the utmost importance, as on the concerted movement of troops may depend the issue, and movements must be directed according to information received. A common form of signaling is what is called "wigwagging," or waving a flag or flags which in certain positions mean certain letters or words, according to a code. Field telegraphs and telephones are also used, the necessary wires being laid with great rapidity by mounted men. The danger of wires being cut or "tapped" by the enemy renders their usefulness uncertain. The heliograph has proved most efficient, and the light signals flashed by this instrument can be seen and read at a distance of many miles through field glasses. In the use of the heliograph the Morse telegraph code, a series of dots

SIGNALING

INTERNATIONAL CODE



BOY SCOUTS' CODE



and dashes, or short and long flashes, is generally used, and to prevent the enemy from profiting by the messages sent, which he may read if the flashes are visible to him, a special code is used in which the words as signaled have quite a different meaning from their usual significance. This is particularly true when messages are sent from airships, as was common in the War of the Nations.

At night, lamps may be used in the same way as the heliograph by day. A shutter covering the light is removed for a short or long flash, according to the Morse code. In cases where barbed wire fences and entanglements are used, messages may be sent the extreme length of the wire merely by tapping the wire with a stick or piece of metal. Wigwagging signals may also be sent by mechanical appliances in which wooden or metal arms are moved up and down. See HELIOGRAPH; SIGNAL CORPS.

Consult United States Army *Signal Book;* Myers' *A Manual of Signals.*

SIGN LANGUAGE, *sine lang'gwayj.* The language of signs was used long before the written history of mankind began. It was the earliest means of communication, employed in the childhood of the race, when the use of symbols and significant gestures was necessary to convey an idea or interpret a message. This primitive method of communication is still used by American Indians of different tribes, who have no common language. For example, the breaking of a strong stick signifies *strength,* and the drawing of the finger across the forehead, to indicate the presence of a cap, represents *white man.* Among other peoples gestures often take the place of words, although they have a spoken language. Charles Dickens, in his account of Italy and its peoples, describes the pantomime language of the streets of Naples, where the conventional sign of hunger is the rapping of the chin:

"Two people are in passing carriages; one touches his lips, twice or thrice, holding up the five fingers of his right hand, and gives a horizontal cut in the air with the palm. The other nods briskly and goes his way. He has been invited to a friendly dinner at half past five o'clock and will certainly come."

The language of signs has been used since the sixteenth century in the education of the deaf. The early teachers conveyed ideas by the use of gestures, position, facial expression and mimic acting, which the pupil was taught to imitate. Many of the signs employed were the same natural expressions used by the Indians—the movement of the hand to the mouth to indicate food, the bowing of the head to represent sorrow or suffering, etc. The manual alphabet, by which letters are interpreted by the position of the fingers, was later introduced, but this spelling with the hands is not properly a sign language (see DEAF AND DUMB).

There are many systems of signs or signals employed in sending messages, such as the wigwagging of flags used in the army, with which every boy scout is familiar; signaling by means of kites; and the flag system used by the government bureaus to indicate the weather (see SIGNALING).

SIGSBEE, *sigs'bi,* CHARLES DWIGHT (1845-), an American naval officer, in command of the *Maine* when it was destroyed in 1898 in Havana harbor. He was graduated at the United States Naval Academy in 1863, in time to have a share in the Battle of Mobile Bay, in the War of Secession, and during the last year of the war served with the North Atlantic squadron. Later he did brilliant work in connection with deep-sea soundings in the Gulf of Mexico. The year before the outbreak of the Spanish-American War Sigsbee was promoted to the rank of captain. His cool and courageous conduct at the time of the disaster to the *Maine* was highly praised, and he was assigned to the command of the auxiliary cruiser *Saint Paul* for the period of the war with Spain. In 1903 he was promoted to be rear admiral, and four years later he retired. Sigsbee is the author of *Deep Sea Sounding and Dredging* and *The Maine: An Account of Her Destruction in Havana Harbor.*

SIGURD, *ze'goort,* in northern mythology, the brave warrior and hero of the *Volsunga Saga,* who vowed in true knightly fashion to right all evil and defend the oppressed. He was the son of Sigmund and Hiordis, but was raised in the brilliant court of his stepfather, Elf. Incited by the stories of Regin, his tutor, the young gallant, after receiving his father's sword, started out to destroy the dragon Fafnir. After killing the monster he ate its heart and was surprised to find that he could understand the language of birds. They told him about Brunhilde, the beautiful maiden who slept in a palace surrounded by flames, awaiting the hero who would come to rescue her. Sigurd immediately mounted the hill to the palace, awakened the imprisoned Brunhilde, whom he loved at first sight, and after promising to return for her, he started off again on his adventures. She was left sorrowful.

Finally he reached the land of the Niblungs, where the queen, who was a sorceress, brewed for Sigurd a potion which caused him to forget Brunhilde and fall in love with her own daughter, Gudrun, whom he married. Later, after he had aided Gudrun's brother, Gunther, to win Brunhilde as his wife, Sigurd's memory returned and he was filled with remorse. Brunhilde, unable to forgive his apparent faithlessness, had him put to death and then in remorse killed herself on his funeral pyre. An extract from William Morris' *Sigurd the Volsung* describes the death of the hero:

"It is Brynhild's deed," he murmured, "and the woman that loves me well;
Naught now is left to repent of, and the tale abides to tell.
I have done many deeds in my life-days; and all these, and my love, they lie
In the hollow hand of Odin till the day of the world go by."

SIKHS, *seeks,* meaning *disciples,* is the name of a religious sect in Northwestern India, which worships one invisible god. The sect was founded by Nanak Shah (1469-1539), who tried to unify the Hindu castes and unite them with the Mohammedans into one great brotherhood.

The political state of the Sikhs was established by Guru Govind. He developed their military power that they might defend themselves from the Mohammedans and other religious classes, but after his death in 1708 his followers were overcome by the Moslems. A few of the Sikhs, however, escaped to the mountains, and in a few years returned and subdued Lahore. They established independent communities which were united in 1792 by Ranjit Singh, a despot who assumed the title of *maharajah* and governed a territory including all of the Punjab and Multan and other adjoining regions with a total area of 70,000 square miles. After his death, the Sikhs came into conflict with the British government in India. In the First Sikh War (1845-1846) they were defeated and forced to give up Lahore. In 1848, during the Second Sikh War, they were completely conquered and their possessions were added to British India.

In the Sepoy Rebellion of 1857, the Sikhs supported the English, chiefly through fear that the Mohammedan power might be restored in India. Numbering over 3,000,000, this sect forms the larger part of the inhabitants of the Punjab. They are a strong, courageous people, and are chiefly engaged in agriculture.

Consult Gough and Inness's *The Sikhs and the Sikh Wars;* Cunningham's *History of the Sikhs.*

SI-KIANG', or HONG-KIANG', the most important river of Southwestern China, has its source in the province of Yunnan and flows in a southeasterly direction for 1,650 miles, discharging through its delta into the South China Sea. Canton, one of the largest cities in China, is situated on one of the arms of the Si-kiang. The river is of considerable commercial importance through its tributaries and a network of canals. It is navigable for the largest vessels as far as Wuchow, and from Wuchow to Samshui for lighter craft. Rapids interrupt navigation in the upper course.

SILENUS, *si le'nus,* in Greek mythology, a demigod, the most distinguished of the satyrs. He was the nurse, teacher and follower of Bacchus. He is represented as very fat, bald and pug-nosed, riding on a broad-backed ass. He is usually pictured as intoxicated, swaying about, and brandishing his drinking cup. See SATYR.

SILESIA, *si le'shi a,* the largest province in Prussia and economically one of the most important states of the German Empire. It contains the richest coal deposits in Germany, and ranks next to Saxony, among the Prussian

LOCATION OF SILESIA

provinces, in value of agricultural products. Historically Silesia is important as the province for whose possession Frederick the Great fought two long and terrible wars, thereby helping to lay the foundations of a mighty empire. The province lies in the extreme southeastern part of Prussia. It has an area of 15,569 square miles and is drained by the Oder River system. In the southern part there are several mountain ranges, and here lie the coal fields. The greater part of the agricultural district lies between the Oder and the southwestern mountain ranges. Rye, oats, wheat, barley, potatoes and beets are raised in large quantities in this region. Silesia is also an important

manufacturing state, holding first rank among the Prussian provinces in the weaving and spinning of flax. Tableware, woolen goods, clothing, yarn and beet sugar are other important manufactures. The chief cities include Breslau (which see), the capital, Görlitz and Königshütte. Population in 1910, 5,225,962.

Related Subjects. The reader is referred to the following articles in these volumes:

Frederick, subhead *Frederick II*	Prussia, subtitle *Government and History*

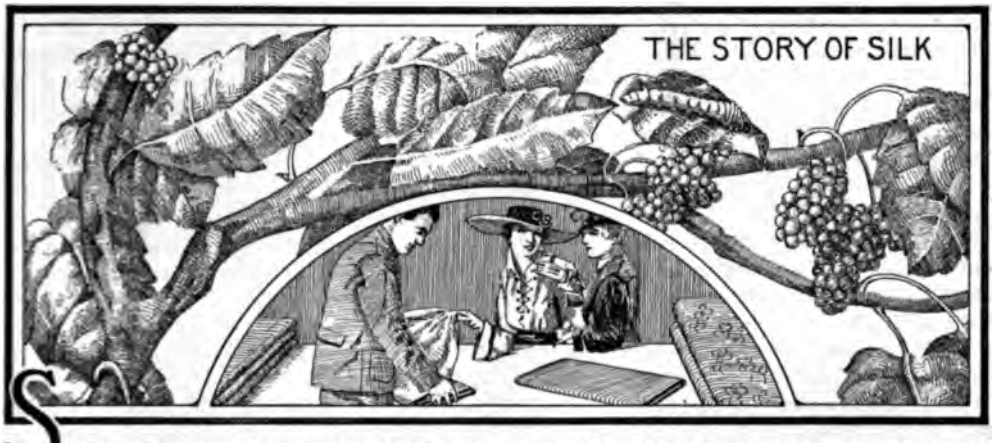
SILICA, *sil'i ka,* one of the most widely distributed substances in the earth. Sand, quartz, gravel and sandstone are composed almost entirely of silica. It occurs also in granite, clay, slate, mica, feldspar and other rocks. It is found in the stalks of grasses and grains, to which it imparts strength and toughness. It also imparts similar qualities to the quills of birds and to living sponges.

Silica is a chemical compound of silicon (which see) and oxygen. It occurs both in crystalline and in amorphous (irregular) forms; that is, without definite structure. Amorphous silica is a soft, white powder, insoluble in water and all acids except hydrofluoric acid. Quartz is the best example of crystallized silica. Many precious stones, like amethyst, jasper and cat's-eyes, are crystallized silica delicately colored in various shades and tints. Other precious stones, like opal, onyx, agate and chalcedony, are amorphous silica variously colored. Flint is an amorphous silica colored black or dull brown.

Related Subjects. The reader is referred to the following articles in these volumes:

Crystallization	Sand
Gems	Sandstone
Quartz	

SILICON, *sil'i kon,* a nonmetallic element, the most abundant in nature with the exception of oxygen, although it does not occur uncombined. Natural silica, or silicon oxide, is the principal constituent of quartz, flint, sand, amethyst, agate, jasper, opal and many other rocks, in most of which it occurs in the form of crystals. Silicon occurs also as a brown powder, which will burn in air and chlorine, and is soluble in alkalies. The chemical symbol for silicon is *Si.* See SILICA.



SILK, a lustrous fiber produced by the most useful insects known. The threads that form the beautiful and costly silk fabrics of our markets are taken from cocoons spun by thousands of little creatures whose ceaseless activity makes possible one of the world's great textile industries. Silk fabrics are among the handsomest and richest textiles used by mankind, and such is the esteem in which they have always been held that writers use the term as a symbol of the luxury and elegance of the most splendid civilizations.

The Silkworm. The humble creator of this rarest of textile fabrics is the silk moth, an insect with a short, blunt body, stout legs and broad, white wings, marked by several black lines running parallel with the borders. Its spread wings measure about two inches from tip to tip. The female moth lays her eggs in the early summer, depositing from 200 to 500 bluish eggs about the size of a pin's head and gluing them together with a gummy secretion. In a wild state, the moth lays her eggs on the mulberry tree; but under cultivation, she is provided with bits of paper or muslin.

The eggs hatch during the following spring, the larvae being about a quarter of an inch long when they emerge. They are voraciously

hungry, and soon consume about their own weight of chopped mulberry leaves as a daily ration. Naturally, they grow with great rapidity, and cast their first skin after a period of about ten days. This process is repeated about four times during a period of six weeks, when the caterpillar is ready to spin its cocoon. It is then three inches long and half an inch in diameter. The body is in twelve segments and is supported by three pairs of true legs and five pairs of hooked prolegs on the hind segments.

The caterpillar now ceases to eat and presently begins spinning its cocoon. In a natural state, it sews two leaves together and spins the cocoon between them; but under cultivation, the worm is supplied with a rack containing numerous small cells, to the sides of which the cocoon is attached. The outer covering, or floss, is first spun, and then the silk is wound in a continuous thread about the body, the worm shrinking in size as it thus spins out its substance. The film is formed from a gluelike material secreted in two glands, one on either side of the body, connecting with an opening in the upper lip called the spinneret. The sticky fluid hardens on contact with air; under the microscope, it appears as a thread of two strands. This thread is sometimes 1,000 yards long; more often, the length does not greatly exceed 500 yards. If left undisturbed, the pupa will hatch in two or three weeks, boring its way through the shell and emerging as a small, white moth. In cocoons from which silk is to be drawn, the insect is killed before it attacks its silky sheath. This is accomplished by placing the chrysalis in a hot oven, exposing it under glass to the rays of the sun or subjecting it to a steam bath.

The cultivation of the silkworm dates in China from a most ancient period; according to Chinese authorities, it was begun as early as 2600 B.C. China is still the chief source of the world's supply of silk fiber, but growing the silkworm is now an important industry in Japan, Italy, Anatolia, Syria, France and Spain. In the United States, the manufacture of silk has been vastly more important than the production of the raw material. Silkworms were introduced into the colonies early in the eighteenth century and cultivated rather extensively. Disastrous speculative activity, together with a blight suffered by the mulberry trees in 1844, dealt the industry a blow from which it has not recovered.

Process of Manufacture. To facilitate the removal of the filament, the cocoon is steeped in warm water, which softens the gum and frees the thread. The double strand spun by the silkworm not being tenacious enough for commercial purposes, several filaments are run together through metal or porcelain guides, or eyes, and these adhere to form a single thread. From the guides, the silk is wound upon reels from sixty to ninety inches in diameter, and this is the so-called "raw silk" delivered to the manufacturer in hanks.

Throwing. Silk goes through what is technically known as a *throwing* process in preparation for the loom. It is heated in soapy water for several hours. It is then dried, stretched upon reels and wound upon bobbins, dirt being removed and any imperfections in the thread noted in the process. This thread, known as "singles," is frequently used for warp in weaving light fabrics. Singles are reeled into large hanks, and these hanks are bound into bundles called "books." In this form a great part of the Asiatic silk reaches America and Europe.

Doubling. Doubling is accomplished by twisting two or more threads together on a bobbin. The resulting silk, known as tram silk, forms the woof in weaving. Organzine, which is used for the warp of heavier fabrics, is made by twisting two or more single threads separately in the same direction and then doubling and retwisting them in the opposite direction.

Scouring and Dyeing. When silk emerges from the throwing machine, it has still too much of the natural gum adhering to the strands. This is removed by boiling in a solution of hot soap. In addition to removing the superfluous gum, scouring prepares the silk to take the most brilliant hues in dyeing. In the process, however, it loses from twenty-five to thirty per cent of its weight, and this loss has resulted in the use of still another process, known as loading. Certain chemicals enable the silk to hold more coloring matter, so that it has been found possible to load black silk up to 900 per cent of its weight. Commonly the loading is, of course, much less than this. Loading is defended by manufacturers, but it undoubtedly lessens the durability of the silk.

Waste. The waste in silk is very considerable. This results from the fact that only about seven-tenths of the filament can be unwound from the cocoon. This waste, together with the coarser flossy covering of the cocoon and the silk taken from cocoons from which the insect has been allowed to escape, is now treated much like wool. Impurities are re-

WORLD BOOK

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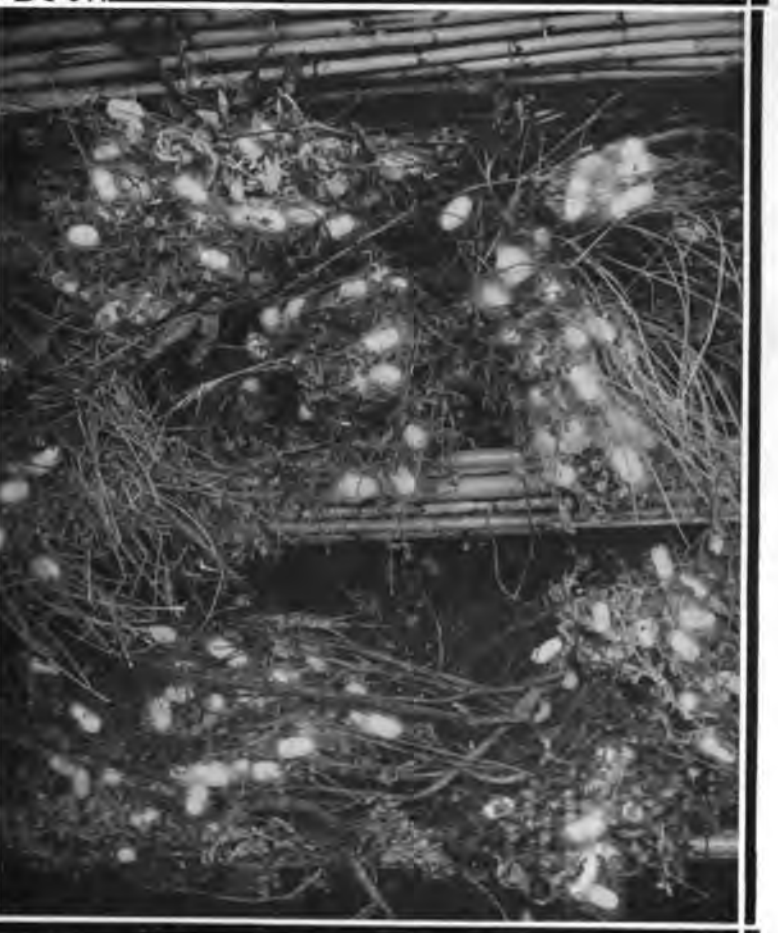

SILKWORMS AND COCOONS.

At left: A basketful of worms gorging themselves on mulberry leaves. At right:

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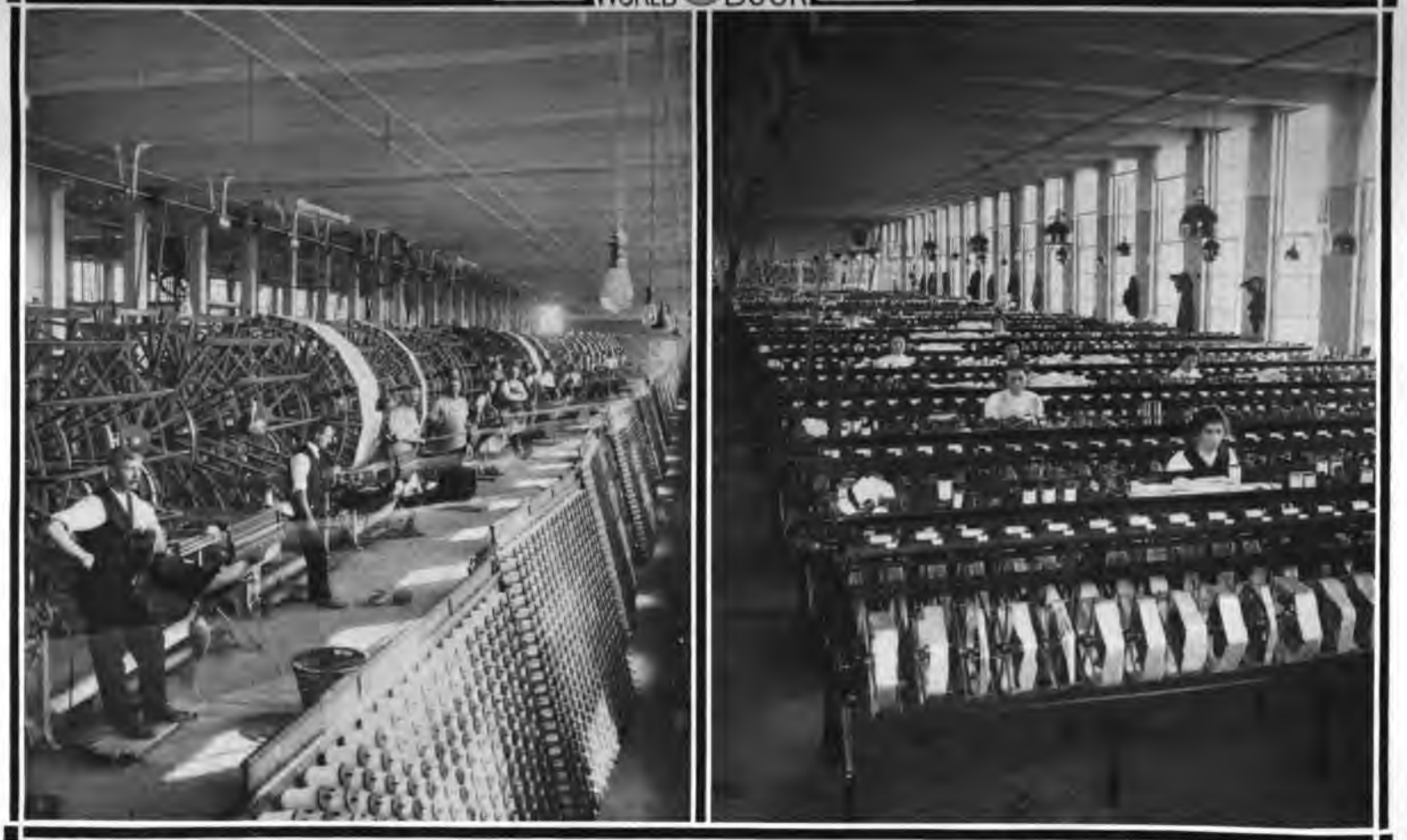
IN AN AMERICAN SILK MILL.

At left: Plain silk weaving, a process requiring skill and patience. At right: Fancy weaving, called Jacquard weaving, from the name of the loom.



AMERICAN SILK MILL.

At left: Warping view in Paterson, N. J., mill.
At right: Winding room of the same mill.

SILK CULTURE. At left: Drying of cocoons; they are turned every day to prevent decomposition of the insects inside them. At right: Inferior cocoons are not exported, but are used at home in silk making, with primitive machinery. Both pictures are from Syria.

moved by combing, and the straightened fibers are run together until thread is formed. This is the spun silk of commerce, which is used in making silk yarns and for woof in certain fabrics.

Weaving. Silk is woven on looms similar to those used for cotton and wool. Power looms have now supplanted hand looms very largely, but in China, where cheap labor prevails, weaving is still a hand craft. In the manufacturing of silk fabrics, France and the United States take the lead. The first silk mill was set up at Mansfield, Conn., in 1810. Power looms appeared about 1838, and the weaving of silk fabrics spread throughout the Eastern states. Of late years the growth has been exceedingly rapid, the manufacture of finished products ranking now among the country's great industries. In the United States there are 660 establishments producing finished silk products, employing nearly 90,000 persons. The capital invested is about $140,000,000, and the value of the product is $185,000,000 yearly. The industry is concentrated in the East, the leading states being New Jersey, Pennsylvania, New York, Connecticut and Massachusetts. The manufacture of sewing silk is an important branch of the industry in the United States. The process of manufacture consists in doubling and twisting the filaments together until a thread of the desired size and strength is produced. China furnishes an average of 20,000,000 pounds of raw silk and 15,500,000 pounds of waste silk to foreign manufacturers yearly. The exports from Japan amount to nearly 30,000,000 pounds a year.

Artificial Silk. The great commercial value of silk has naturally led to many attempts to place a substitute on the market. Cotton and the pulp of soft woods have been experimented with. Cotton is carded and steeped in a mixture of fifteen parts of nitric acid to eighty-five parts of sulphuric acid until its color is clear blue. It is then washed and dissolved in a mixture of ether and alcohol, forming collodion. The collodion is then fed between rollers, which squeeze the liquid through small tubes into nitric acid diluted with water. The resulting fibers are wound upon reels, washed, twisted, spun and dyed. The process for wood fiber is similar. Though the cost of manufacture is considerably less than that of natural silk, artificial silk has not been extensively used. G.B.D.

Consult Posselt's *Structure of Fibres, Yarns and Fabrics.*

A Booklet on Silk

Use two sheets of paper 9 x 12 inches, or larger, and fold once, making eight pages.

Cover page—*Story of Silk* in center; name of school and pupil's name at bottom.
Illustrations: Border of conventionalized mulberry leaves (see page 3596); several moths in flight.

Inside cover—Blank.

Page three—Essay, *The Moth and Its Eggs.*
Illustration: Spray of mulberry leaves with moth and eggs on leaves.

Page four—Essay, *The Worm and Its Cocoon.*
Illustrations: Worms feeding on leaves; a group of cocoons.

Page five—Essay, *The Making of Raw Silk* (killing of grubs, loosening and winding of fiber).
Illustration: Hanks of raw silk.

Page six—Essay, *Silk Weaving.*
Illustration: Machine with silk wound upon it.

Page seven—A page of original designs for silks, done in colors; show stripes, plaids and figured patterns.

Page eight—List of articles made from silk.
Illustrations: Articles made from silk, as ribbons, gloves, stockings, neckties, etc.

Related Subjects. The reader may consult the following articles in these volumes:

Adulteration of Foodstuffs and Clothing	Moth
Cocoon	Mulberry
	Weaving

SILKWORM. See SILK, subhead *The Silkworm.*

SILK'WORM GUT, a substance made from fiber drawn from a silkworm which was killed at the time it was ready to spin. The thread, after going through several interesting processes, is used to form the hook end of a fishline. It is first soaked in cold water and then in a caustic solution. The outside covering is then taken off and the thread is dried, and, if desired, bleached white. A pound of gut can be made from about 25,000 threads. Silkworm gut is valued because it is strong and is invisible in water.

SI'LO AND SILAGE, *si'layj.* The word *silo* is applied to a structure in which green crops

are stored for winter feed for farm stock. *Silage* is the term by which the feed is known. The storing of silage is of recent origin in America, having been introduced from Europe in 1875. Few well-equipped farms are now without one or more silos.

How to Make a Silo. The first silos used in America were merely pits dug in the ground and covered with boards when full. These were abandoned for square wooden buildings, which were also found unsatisfactory, as the angles prevented the proper filling of the space and the exclusion of air. Next came the circular silo, which is now universally adopted as the most convenient for filling and the best for storage purposes. The silo may be of wood, brick, stone or concrete, the last-named material being the most satisfactory.

Whatever the material used, care must be taken to make the walls air-tight, as on this depends the quality of the silage. Concrete walls are usually built six inches thick at the bottom, tapering to four inches at the top. For wooden silos, southern cypress is the best material to be obtained. The cost of this wood is high in some localities, however, and it may be replaced by white pine or hemlock, which are cheap and durable. A silo is generally built with a conical roof and may be so constructed that it becomes an ornament to the farm. The silage may be put in and removed through a door at the top or it may be put in at the top and taken out through doors built into the sides. Some silos are equipped with ventilators which carry off the gases rising from the silage. This is not at all necessary, and the ventilators merely cause extra expense. A silo should always be circular and never less than six feet in diameter. A serviceable size is ten feet in diameter and twenty-five or thirty feet high. The diameter may be increased, but the height should remain about the same.

Silage or Ensilage. The chief food plants used for silage are corn, clover, oats, rye, sorghum, alfalfa, cow peas and beans. The most desirable of these is corn. The crop should be cut before the moisture in the plants commences to dry. The silage must be placed evenly in the silos, carefully spread in layers, and pressed down. One cubic foot of properly packed silage will weigh about forty pounds. As silage does not constitute the sole winter food, forty pounds will be quite sufficient for a cow's daily ration, so the amount of silage to be stored can be readily calculated on that basis. One ton of silage will feed a cow for fifty days. A herd of twenty cows fed on silage for 150 days will therefore require sixty tons of silage. An allowance of about ten per cent should be made for waste, so that sixty-six tons should be stored to produce sixty tons of food. In removing silage from the top, care

AN ORDINARY SILO
The opening shows something of the interior appearance.

should be taken that it is reduced evenly in layers and not taken more from one side than another. The top layer is of course most liable to spoil, especially if it is allowed to become uneven.

Silage has proved such a great benefit to farmers that it now forms the chief winter food for farm and dairy stock. Certain chemical changes take place during storage, but the food value of silage is about the same as that of the green crop. Dairy cattle, especially, thrive on silage, as it is juicy, nutritious and a good milk producer. Three tons of good mixed silage are equal in food value to one ton of good timothy and clover hay, but it must be remembered that one acre of land planted to corn will produce silage equal to four tons of hay. The cost of growing and storing silage varies, but may be reckoned as averaging between $1.75 and $2.50 per ton.

There have been many arguments in agricultural circles concerning the packing of silage. Some authorities maintain that the corn or other crops should be packed whole; others claim that it should be cut. It is now generally admitted that when cut into short lengths, the silage packs better, undergoes less fermentation and is better preserved than when stored whole. F.ST.A.

Consult Rabild, Risser and Parks' "Homemade Silos," in *Farmers' Bulletin No. 589,* United States Department of Agriculture.

SILURIAN, *si lu'ri an,* **PERIOD,** that division of geologic time in the Paleozoic Era extending from the Ordovician Period to the Devonian. It takes its name from the Silures, a people of ancient Britain, where the rocks were first studied. The rock formations were very extensive, and they are found in all the continents. They were chiefly limestones and sandstones. In the United States and Canada the Niagara, Helderberg, Salina and Onondaga are some of the most important systems. The great salt beds of New York and Michigan were formed during this period, as were the deposits of gypsum and the iron ore of the Appalachian region. The greater part of the Appalachian Mountains was thrown up and the Delaware Water Gap was formed. Life, so far as known, consisted chiefly of shellfish and starfish forms, corals and sea lilies (crinoids), and fish were beginning to appear.

Related Subjects. The reader is referred to the following articles in these volumes:

Devonian Period
Geology, page 2439
Ordovician Period
Paleozoic Era

SIL'VER, a precious metal used from early times for ornamental purposes, utensils, money and jewelry. It is much less valuable than gold among the metals. Silver has a beautiful luster and a whitish color that is referred to in descriptions of the sea and clouds. It was known to the ancient Hebrews by a term meaning *pale,* and the name assigned to it by the ancient Greeks signifies *shining.* Its chemical symbol, *Ag,* is derived from the Latin word for *silver,* or *argentum.*

Properties. Although harder than gold, silver is softer than copper. It is malleable, for it can be beaten into sheets one one-hundred-thousandth of an inch in thickness, or thin enough to transmit light. It is ductile, as it can be drawn into wire finer than human hair. It is second only to gold as a conductor of heat and is surpassed by no metal as a conductor of electricity.

Silver melts at about 1728° F., and when molten has the power of absorbing twenty times its volume of oxygen. Upon solidification the oxygen is given up, but if the metal cools rapidly and a crust is formed before the

COUNTRIES LEADING IN PRODUCTION
Four countries produce each over fifteen million ounces of silver each year.

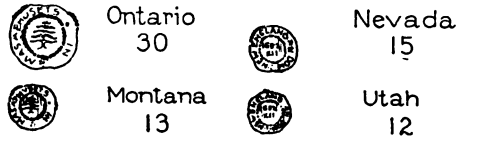
air has escaped, bubbles of gas are formed in the metal and burst through the crust, driving out small ball-like masses of silver. This action, occurring only in pure silver, is known as "spitting," and may be prevented by adding a small amount of bismuth, copper, zinc, salt or powdered charcoal. Silver is not affected by moisture or dryness, alkalies or vegetable acids, but sulphur or sulphureted air blackens it, and thus it quickly tarnishes in rooms lighted by coal gas. Its noncorrosive properties make it valuable for surgical uses.

Alloys and Compounds. As silver is too soft to stand constant wear without any hardening element, for commercial purposes it is generally mixed with copper to form what is called an *alloy.* Such an alloy is used in making coins, jewelry and tableware. The United States sil-

ver coins contain 900 parts of silver to 100 parts of copper, while the British have 925 parts of silver to seventy-five of copper. Sterling silver, so popular for jewelry and tableware, is of the same quality as the British coin.

The most important compound is a white solid called *silver nitrate* or *lunar caustic.* It is produced by dissolving silver in nitric acid, and is employed extensively in photography, silver plating and in making indelible ink. *Silver chloride,* another compound, is made by adding hydrochloric acid to a solution of a silver compound. It, too, is used in photography.

Sources. Mexico, Ontario, Nevada, Montana, Utah, Arizona, Norway, South America and Australia are the chief sections from which native silver is obtained. The most important ores are the sulphides, that is, those containing



Figures Represent Millions of Fine Ounces

LEADING STATES AND PROVINCES

There are four which produce more than ten million ounces of silver each in average years.

sulphur. The richest ore, found in several parts of the United States, is *argentite,* a simple sulphide in which the proportion of silver is indicated by the atomic symbol Ag_2S. The other sulphides, found chiefly in Mexico, Peru, Bolivia, Chili and Idaho, are complex. They include *light ruby silver* (arsenic, sulphur and silver), *dark ruby silver* (antimony, sulphur and silver) and *brittle silver* (same combining elements as dark ruby). Other important ores are *horn silver,* containing chlorine and silver, and *hessite,* a combination of silver and tellurium. Galena, the chief ore from which lead is extracted, often carries silver, and in the Coeur d' Alene district of Idaho there is a valuable mine worked both for lead and silver. In the Butte (Mont.) district silver occurs in the copper ores, and this is also true of the copper ores of a famous mine in Mansfeld, Germany. In Europe, however, the larger part of the silver is obtained from galena ores. There are various silver alloys, including those containing gold, mercury and copper. Gold found in California contains on an average twelve per cent of silver. For methods of extraction, see METALLURGY.

Production. The richest silver mines on the globe are in the two American continents. Mexico and the United States alone produce nearly three-fourths of the world's supply of that metal. Canada is also an important producer of silver, the value of its annual output averaging $19,000,000 (see CANADA, subhead *Silver and Lead,* page 1108). In the United States Nevada holds first rank (see NEVADA, subhead *Minerals*). In Europe the richest mines are in Spain, Austria-Hungary, Germany and Norway, with Germany usually ranking first in amount produced. Silver ore has also been found in large quantities in Australia (see AUSTRALIA, subhead *Mineral Resources*). E.B.P.

Consult Clennell's *The Cyanide Handbook;* Crane's *Gold and Silver.*

Related Subjects. In addition to references above the attention of the reader is directed to the following articles:

Alloy	Metals
Lunar Caustic	Photography

SIMCOE, *sim'ko,* a town in Ontario, the county town of Norfolk County. It is in the southern part of Ontario, and is forty-six miles southwest of Hamilton and seventy-three miles southwest of Toronto. Port Dover, an important port on Lake Erie, is seven miles from Simcoe. Simcoe is served by the Grand Trunk, Wabash, and Lake Erie & Northern Electric railways. It lies in the heart of one of the richest agricultural sections in Ontario, and one of its chief industries is the canning of fruits and vegetables. It has the largest exclusive lithographing plant in Canada. There are also a large woolen mill and other smaller factories. Simcoe owns its water works (since 1906), sewerage system (1913) and hydroelectric plant (1914). Its Carnegie Library was erected in 1912. Simcoe was founded early in the nineteenth century, and was incorporated in 1851. It was named for John Graves Simcoe (which see). Population in 1911, 3,227; in 1916, estimated, 4,160.

SIMCOE, JOHN GRAVES (1752-1806), a British general and colonial administrator, first governor of Upper Canada. Simcoe was born at Northamptonshire, England. After receiving his education at Eton and Merton College, Oxford, he entered the army in 1771. He served throughout the Revolutionary War in America, was wounded at Brandywine and Monmouth, and with Cornwallis surrendered at Yorktown in 1781. From 1791 to 1796 he was the first governor of Upper Canada. As governor he made every effort to induce the immigration of those Americans who were loyal to Great Britain but had been unable to

face the hardships of the earlier Loyalists who had settled in Canada. He was a man of great energy, and personally supervised the building of roads and bridges. Simcoe, too, was largely responsible for the removal of the capital from Newark to Toronto, and he camped in a tent on the site of the future city until better quarters could be provided. Lake Simcoe and the town and county of Simcoe in Ontario were named in his honor.

JOHN GRAVES SIMCOE

After leaving Canada in 1796, Simcoe was governor of Santo Domingo for nearly two years. In 1806 he was appointed commander-in-chief in India, but returned home almost at once on account of illness and died in England. He was created lieutenant-general in 1798.

Consult Scott's *John Graves Simcoe.*

SIMCOE, LAKE, a small lake in Ontario about midway between Georgian Bay and Lake Ontario. It has an area of 271 square miles, a length of thirty miles and a maximum width of eighteen miles. Its surface is about 130 feet above Georgian Bay, into which its surplus waters flow through Lake Couchiching and the Severn River. Lake Simcoe is a delightful summer resort, and its many pretty islands and densely-wooded shores are studded with cottages and villas. During the winter the lake freezes over sufficiently to provide a thoroughfare and also to supply Toronto and other nearby cities with a large part of their summer's supply of ice. Barrie and Orillia are the principal towns on its banks.

Lake Simcoe is of considerable historic interest. In the days of the coureurs-de-bois it was on the main route from the east to Lake Huron and Fort Mackinac. This route began with a long portage from the site of Toronto, on Lake Erie, to Lake Simcoe. After crossing Lake Simcoe the trappers again portaged to the Nottawasaga River, and down the river to Georgian Bay. This region was the scene of the great war in which the Iroquois practically exterminated the Huron Indians. The lake was named for John Graves Simcoe (which see).

SIMILE, *sim'ilee,* a figure of speech in which some resemblance between two objects essentially different is pointed out by means of some definite word, as *like* or *as.* It is this explicit statement of the comparison which distinguishes it from the metaphor. Such commonly used expressions as "She ran like a deer," "It was as sudden as lightning" are similes, but all figures of this class are not so simple. The so-called *Homeric* simile is a long, involved comparison, worked out beyond the point where real resemblance ceases.

Often similes become so much a part of everyday speech and thought that the specific word of comparison, *like* or *as,* is dropped, and the figure becomes a metaphor. Thus, when a crafty, cunning man was first described in the words "He is like a fox," the figure was doubtless striking; but the resemblance has come to be taken so completely for granted that the metaphor, "He is a fox," is much the more natural expression to use. See FIGURE OF SPEECH.

SIM'LA, the capital of the district of Simla, in the province of the Punjab, India, and the summer capital of British India. Because of its situation on a spur of the Himalaya Mountains, 7,000 feet above sea level, and its cool, healthful climate, a great number of Europeans from all parts of India make it their temporary residence during the hot season. The viceroy of India and his assistants retire from the capital to Simla early in the summer, and several government officials have established permanent headquarters there. In the place there are many picturesque villas, churches, institutions, schools, hotels, clubs and banks. The town is about 170 miles north of Delhi, and since 1903 has had connection with the Peninsular railway system. Permanent population, about 15,000; summer population, about 35,000. See PUNJAB.

SIMMS, WILLIAM GILMORE (1806-1870), an American novelist and poet, with the exception of Edgar Allan Poe the most brilliant man of letters produced by the South before the War of Secession. For spirited narrative, vivid description and faithful portrayal of local conditions, nothing excels his border romances of the Southwest—*Guy Rivers, Border Beagles* and *Beauchampe;* his story of Indian warfare in the early days of the Carolinas—*Yemassee;* or his tales of the Revolutionary War—*Mellichampe, The Scout, Woodcraft* and others. In these romances he shows himself a disciple of Cooper. He was also a successful writer of short stories, the best of which may be found in the two volumes published under the title *The Wigwam and the Cabin.* A history of

South Carolina and several biographies of well-known Southern men are included in the list of his prose writings. As a war poet Simms is still held in affectionate remembrance by his countrymen in the South, and he has written several poems of enduring value. Among the best known of these are *Atalantis, a Story of the Sea, The Swamp Fox* and *The Lost Pleiad.* The latter is probably his finest achievement in verse, and its closing lines are often quoted:

The hope most precious is the soonest lost,
The flower most sweet is first to feel the frost.
Are not all short-lived things the loveliest?
And, like the pale star, shooting down the sky,
Look they not ever brightest, as they fly
From the lone sphere they blest?

Simms was born in Charleston, S. C., also the birthplace of a contemporary poet, Henry Timrod. He was educated for the profession of law, and was admitted to the bar in 1827, but never practiced to any extent. His first volumes of poems were published the same year, and the following year he became owner and editor of the *Charleston City Gazette.* Thereafter he devoted himself entirely to journalism and literature. He supported the cause of the South earnestly and lost the greater part of his fortune during the war. An excellent biography of Simms, by W. P. Trent, has been included in the *American Men of Letters Series.*

SIMONIDES, *si mon' i deez* (556-468 B. C.), a celebrated Greek lyric poet and one of the most accomplished men of antiquity. He excelled in his triumphal odes and elegies. These are characterized by a sweetness, simplicity, pathos and power of expression which rank him with Pindar, his contemporary and great rival, whom Simonides scandalized because he accepted pay for his writings. See PINDAR.

The young poet was treated with great consideration by Hipparchus. Later he enjoyed the patronage of powerful families of Thessaly. After the invasion of Greece by the Persians he wrote a number of elegies, dirges and epigrams celebrating the heroes and the battles of that struggle; for his elegy on the soldiers who fell at Marathon he won the prize over Aeschylus. He won fifty-five other prizes in similar poetical contests. His last years were spent at the court of Hiero of Syracuse.

SIMOOM', a hot, dry, destructive wind common to the Sahara and Arabian deserts, which carries with it great clouds of dust, so that the whole sky becomes hazy. It is one of the terrors of the desert, arriving suddenly and suffocating men and beasts. Travelers have to lie down close to the ground with their heads covered, and the camels burrow their noses into the sand. The simoom may pass in ten minutes or it may last for hours, even for days, leaving the sand drifted like snow after a blizzard. In March, 1901, there was a great African simoom which scattered red and yellow sand and dust over all of Southern Europe, and it was even reported that sand fell in England. This wind is caused by the overheating of the soil and layers of air next to it. The burning hot air ascends and cooler currents from all sides flow in, producing a desert whirlwind.

Related Subjects. The reader is referred to the article WIND and to the titles there listed.

SIM'PLON, a pass in the Swiss Alps over which Napoleon built a magnificent road in 1800-1806. The construction of this highway is considered one of the great feats of modern engineering; it is forty-two miles long and between twenty and thirty feet wide, and is carried over 611 bridges. In other places it runs through huge tunnels. The pass lies near the frontier of Piedmont, Italy, in the eastern part of the canton of Valais. The name is also applied to the largest railway tunnel in the world, built through the Alps at this point between Brieg and Isella. It consists of two single-track bores nearly twelve and one-half miles in length, and was completed in 1906, eight years after work was begun. The pass is 6,592 feet above sea level; the highest point of the railway tunnel, about 2,300 feet.

SIMP'SON, SIR GEORGE (1792-1860), a Canadian explorer and administrator, for thirty-five years governor of Rupert's Land and general superintendent in America for the Hudson's Bay Company. Simpson was a native of Ross-shire, Scotland, and was sent to America in 1820 by the Earl of Selkirk, then the guiding spirit of the Hudson's Bay Company. After the union of the Northwest and Hudson's Bay companies, in 1821, Simpson was appointed governor of the northern department and in the same year governor of all Rupert's Land. Physically a small man, Simpson yet had boundless energy, and he had, in the words of a contemporary, "the self-possession of an emperor." Every year he made the overland journey from Montreal to the far West, on several of his investigation trips crossing the Rocky Mountains.

Under his aggressive administration the country between the Pacific Ocean and the Rockies was occupied, and to his enterprise Canada is chiefly indebted for its control of the Pacific

coast. He sent out numerous exploring expeditions, and himself led several. He was knighted in 1841, and in the same year started on a journey around the world, which he described in *A Narrative of a Journey Round the World in the Years 1841 and 1842.*

SIMPSON, Sir James Young (1811-1870), a distinguished Scotch physician, the discoverer of the anesthetic qualities of chloroform. He was born at Bathgate and educated at the University of Edinburgh, from which he received the M. D. degree in 1832. In 1840 he became professor of medicine and midwifery in the university, and seven years later was appointed physician to the queen of England. In that same year he announced his important discovery, and his advocacy of the use of chloroform in childbirth gave rise to heated and widespread discussion. Simpson was also the inventor of a means of arresting loss of blood in hemorrhage. For his great service to his profession he received various honors and in 1866 was created a baronet. He was given a public funeral, and a maternity hospital was founded in Edinburgh in his honor. See Anesthetic; Chloroform.

SIMS, William Sowden (1858-), an American vice-admiral who commanded the American naval forces in European waters after the United States joined the allies in the War of the Nations. He was born at Port Hope, Canada, but was educated in the United States. He entered the Naval Academy at Annapolis, was graduated in 1880, and then rose steadily in the service, attaining the rank of vice-admiral in 1917. From 1897 to 1900 he was naval attaché to the American embassies at Paris and Petrograd (Saint Petersburg), after which he was appointed fleet intelligence officer and inspector of target practice for the Asiatic squadron. In this capacity he reported to President Roosevelt a new system of target practice for the navy gunners. The President ordered him home and had the system adopted, and between 1902 and 1909 Sims was inspector of target practice at the Bureau of Navigation. He was thus instrumental in vastly improving American gunnery practice.

VICE-ADMIRAL SIMS
The foremost American naval commander in the War of the Nations.

Between 1909 and 1911 he was commander of the *Minnesota,* for the next two years was a member of the Naval War College, and in 1913 was appointed to the command of the Atlantic torpedo flotilla. The entrance of America into the European war brought further responsibilities. His promotion to the rank of vice-admiral, ordered by President Wilson in 1917, gave him an equal standing with the British and French naval commanders, and during an interval in which the commanding British officer on the coast of Ireland was absent Admiral Sims held chief command of the allied fleet in the Irish Sea.

SINAI, *si'ni',* or *si'nai,* the mountain, called also in Scripture *Horeb,* on which Moses received the law. It is supposed to be one of the three peaks of the mountain range on the peninsula of Sinai, which lies between the two arms of the Red Sea—the gulfs of Suez and Akabah. The Children of Israel camped on the plain before Sinai while Moses remained forty days upon the Mount; at the end of this period he returned with the Ten Commandments written on tables of stone. *Sinai* is often used figuratively in literature to symbolize the legal side of God's dealing with men, as *Olivet* and *Galilee* represent the milder aspects of forgiveness and grace.

SINCLAIR, Upton [Beall] (1878-), an American writer and prominent advocate of socialism, was born at Baltimore, Md. He was graduated from the College of the City of New York in 1897, then spent four years in postgraduate work at Columbia University. Sinclair became widely known in 1906 as the author of a novel called *The Jungle,* which exposed conditions then existing in the Chicago stockyards. As the result of his agitation an investigation was ordered by President Roosevelt, and improvement followed. Sinclair is an advocate of coöperative housekeeping, and he founded a colony on that basis in 1906, near Englewood, N. J. As the building burned down in 1907, the experiment could not be fully worked out. He also was one of the founders of the Intercollegiate Socialist Society. In 1917 he withdrew from the Socialist party because of the opposition of that party to American participation in the War of the Nations. His writings include *Springtime and Harvest, The Money-Changers, Sylvia, The*

Cry for Justice and *King Coal, a Novel of the Colorado Strike.*

SIN'DIA, the family name of the Mahratta dynasty, the rulers of Gwalior, a native state of Central India, until conquered by the English in 1844. They were first known to fame in the early part of the eighteenth century, when Ranoji Sindia, who had risen from the position of a slipper carrier to the peshwa (prince), was made the commander of the royal bodyguard. When he was sent to collect tribute from the people of the Malwa district, Sindia established headquarters there and built up his own dominions, where, after his death in 1754, his descendants continued to reign until the occupation of the country by England.

The most powerful of these successors was Madaji Sindia, who, in 1781, executed a treaty with Great Britain by which he secured European discipline and tactics for his army. Thus equipped beyond the dreams of other native princes, he subjugated Delhi and Agra and forced the emperor to a secondary position, Sindia himself acting in supreme capacity in every important matter.

SIND'ING, CHRISTIAN (1856-), a prominent Norwegian composer and teacher. His compositions are interesting because they suggest the spirit of Northern lands and have charm of melody and excellence of construction. At the Leipzig Conservatory, where Sinding studied, he won high honors as a pianist and organist. His principal works include a symphony in D minor, the *Rondo Infinito* for orchestra, the suite *Episodes Chevalaresque,* the piano concerto in D flat, and the violin concerto, op. 45. In 1910 his opera *Der heilige Berg* was produced in Berlin.

SINGAPORE, *sing ga pohr',* one of the parts of the Straits Settlements, an island and city which is an Asiatic colony of Great Britain (for location see colored map, opposite page 417). The island is about twenty-seven miles long and fourteen miles wide, and lies off the southern end of the Malay Peninsula, from which it is separated by a strait less than a mile in width. Its area is 217 square miles, and in 1913 it had an estimated population of 330,042 (including dependencies), most of whom live in the city of Singapore, capital of the Straits Settlements. Christmas Island, the Keeling Islands and Labuan Island are dependencies of Singapore.

The city of Singapore is the most important commercial emporium of Southeastern Asia. It is a free port and has a large, convenient harbor, with miles of wharves, quays and docks. Many oceanic routes meet at this port of call. Singapore is a well-fortified, picturesque city, with a beautiful esplanada on the outer harbor, and numerous handsome buildings, cathedrals and museums. It has one of the finest botanical gardens in the world, and branches of the Royal Asiatic and other learned societies. Despite its nearness to the equator (ninety miles), the climate is agreeable and healthful. Cocoanut oil, spices, teak-wood and hides, sago, tapioca, sugar, tortoise shell, mother-of-pearl, India rubber, coffee and tobacco are important exports. See STRAITS SETTLEMENTS.

SING'ING. Musical tones are produced by the same mechanism as speaking tones; that is, the vocal cords are set in vibration by a current of air from the lungs, and these vibrations produce sound. In singing, however, one uses many more notes than in talking. In the production of singing tones the cords undergo considerable tension, or stretching, and the higher one sings the more tightly the cords are stretched, just as the higher notes on a violin are produced by the tightly-stretched strings. Pitch is also determined by the length of the vocal cords. Women have shorter cords than men and their voices are higher pitched, as the shorter the cord the higher the pitch. A very long cord gives a deep bass voice, the lowest division of the singing voice. The other divisions, named in order from low to high, are barytone, tenor, alto and soprano. The compass of the average singing voice is twelve tones, but that of trained singers varies from two to three octaves or more. As the ability to sing well is based on proper breathing, singing lessons are sometimes a means of building up the bodily health.

Consult Marchesi's *Ten Singing Lessons;* Henderson's *Art of the Singers;* Mills' *Voice Production in Singing and Speaking.*

Related Subjects. In connection with this discussion of singing the reader should consult the following articles in these volumes:

Music
Sound, subhead *High Tones and Low*
Voice, subhead *How to Cultivate the Voice*

SINGLE, *sing'g'l,* TAX, a method of taxation which would raise all the revenues needed by the government by a single tax on land. As generally used, the term designates the plan formulated by Henry George, an American journalist and economist. George did not originate the doctrine; he did, however, give it its simplest and most lucid expression.

Theory of the Single Tax. The argument developed by George in his book, *Progress and Poverty,* is that the land belongs by right to all the people, and no generation has the right to alienate permanently any portion of it. In studying economic progress, he arrived at the conclusion that it is marked by increasing extremes of wealth and poverty. This is a result of the tendency of a small part of the community to obtain possession of the land, which is the great natural source of wealth. As long as free land is obtainable, the laborer continues to command a good living wage; but when no such land is obtainable, he is compelled to pay a price for the use of land, and consequently he no longer retains all the wealth he produces by his labor. A considerable portion of it goes to the landlord in the form of rent (which see). Rent, according to the single-tax theory, tends to absorb all values above the minimum wages and interest; this is manifestly unjust and socially undesirable. A few square feet of rocky soil on the point of Manhattan Island (New York City) are worth a fortune, and this value is created by the presence, within a small area, of over four million people. It is pressure of population that creates excessive land values; consequently it is to be regarded as a social value, and the community as a whole should share it.

Since they regard the private ownership of land as wrong, single-taxers do not hesitate to urge a tax sufficient to absorb practically the whole of the landlord's share. In their scheme of taxation, he would be left only a sufficient reward to induce him to collect the rent and pay his tax. In fixing this tax it would be necessary to discriminate between the actual value of the land and that added by improvements. This actual value, created by nature and population, is known to economists as *pure rent,* and the absorption by society of practically all pure rent is the aim of single tax. This rent would be more than sufficient to defray the expenses of government, and no other form of property would need to be taxed. Such a scheme of taxation would prevent the holding of vacant land for speculative purposes, since taxes so heavy could not be supported by idle land. Thus land which is now waste could be made to add to the total economic output. According to its adherents, the single tax would have the effect of equalizing opportunity in every sphere and would greatly stimulate production. It would largely do away with extreme wealth and poverty.

Objections to the System. Critics of the system have pointed out that property is a social product, the right to hold which is granted for purposes of expediency. It is safeguarded by contracts, guaranteed by the state. Any such violent disturbance of the delicately-adjusted economic and social scheme as confiscation implies would work great hardship and injustice on a considerable part of the community. As regards its effect upon industry, it has been urged that to vest real ownership of the land in the government would be to reduce farmers to the status of tenants and to discourage the tendency to improve the land, which is most certainly stimulated by private ownership. A third criticism is to the effect that revenues derived from land alone would be inelastic and ill adjusted to the actual needs of government.

Progress of Single Tax Movement. Naturally the single tax can only be the result of a gradual development, step by step. The first step is municipal single tax, which means that the tax on land values is limited by the requirements of local government.

Municipal single tax has been introduced in many parts of the world. *Progress and Poverty,* Henry George's great book, was published in 1879, and in 1890, only eleven years later, the legislature of Queensland, Australia, required its municipalities to exempt all personal property and all real estate improvements from taxation. In the next year New Zealand adopted single tax in a modified form by providing a graduated state land tax, and since 1896 about one-half of the local taxing districts have adopted the complete municipal single tax.

In Canada the single tax has made greatest progress in the West, where it has been adopted by nearly all the larger cities, including Vancouver, Victoria and Edmonton. In 1912 all towns, villages and rural municipalities in Alberta were required to raise their local revenues by taxes on land values. In Saskatchewan since 1914 a super-tax of $40 has been levied on each 640 acres of uncultivated land. British Columbia in 1892 required municipalities to assess improvements on land at not more than fifty per cent of actual value, but many of the municipalities have since gone the whole distance and no longer tax any improvements.

In the United States the single tax has not been as extensively adopted, chiefly because most American cities are not free to change

their system of taxation. Canadian cities have a larger degree of home rule than most cities in the United States, but even in the latter country the single tax has been adopted, notably by Pueblo, Colo., Houston, Tex., and Pittsburgh and Scranton, Pa. Pueblo in 1913 voted to exempt practically all property except land values from taxation; in the first year fifty per cent of the assessed value of improvements was stricken from the tax list, and in the second year, ninety-nine per cent. In Pittsburgh and Scranton, twelve years, from 1913 to 1925, were allowed to reduce the assessment on improvements by fifty per cent.

National Single Tax. Schemes for a national single tax include such a violent readjustment of existing conditions that even its most earnest advocates do not indulge hope. Under such a system there would be no tariffs, no income taxes, no taxes of any kind except on land. As a preliminary to national single tax there must be universal free trade. The single-taxers believe that universal free trade, like the single tax itself, can be brought about only by incredibly slow movement. Once inaugurated, however, world-wide free trade and single tax, it is claimed, would increase international trade to such proportions that the nations of the world would be bound together into an inseparable brotherhood. The ultimate result of the single tax would be the abolition of war, for mere self-interest would require peace. The most ardent advocates of the single tax believe that it would create a new and higher patriotism in the world. G.B.D.

Consult George's *Progress and Poverty;* Matthews' *Taxation and the Distribution of Wealth.*

Related Subjects. The reader is referred to the following articles in these volumes:

Economics	Rent
George, Henry	Tax

SING SING, one of the largest state prisons in the United States, situated outside the village of Ossining, N. Y., about thirty miles north of New York City. It was erected by convicts, the first draft of whom, men from Auburn state prison, began work on the men's building in May, 1825. A building for women was erected in 1835. The buildings of the prison are antiquated and unsatisfactory, judged by prison methods of the present day, and are not well adapted to the introduction of prison reform. At the same time, under the administration of Thomas Matt Osborne, who was warden from 1914 to 1916, several reforms were inaugurated, and the moral and physical conditions of the prisoners were considerably improved. As a result of Osborne's agitation the New York state legislature passed a bill authorizing the erection of a new and adequate prison to take the place of the old one. See OSSINING.

SINN FEIN, *sin fayn,* an Irish society devoted to the single purpose of establishing an "Irish Ireland." It opposes control of the island by Great Britain, and is working for Irish independence. The society took a leading part in the short and unsuccessful revolution which attempted to found an Irish republic in April, 1916. The words *Sinn* and *Fein* are from the Gaelic language, the ancient tongue of Ireland, and mean *Ourselves Alone.* They were first made the name of the newspaper previously called the *United Irishman,* and then became the title of the organization which grew up among the readers of the paper—Irish poets and philosophers who dreamed of a native land as distinctly an individual nation as England itself. The Sinn Fein continued to exist after the suppression of the revolt, the history of which is given in the article IRELAND, and a member of the organization, though he was in prison, was elected to Parliament in 1917.

SIOUAN, *soo'an,* **INDIANS,** next to the Algonquian group, the largest linguistic family of North American Indians north of Mexico. The largest tribal group of Siouan Indians is the Sioux, or Dakotas. The principal body formerly ranged along the west bank of the Mississippi, northward from the Arkansas, and nearly to the Rocky Mountains. They also ranged northward for some distance into Canada in the direction of Lake Winnipeg. The eastern tribes lived in wigwams of bark and mat, but the bands on the plains lived in teepees made of earth and skins. The principal tribes of the Siouan family are the Omaha, Sioux, Winnebago, Assiniboin, Osage, Ponca and Quapaw, but there are numerous others. The Sioux, or Dakotas, were the most hostile to the white settlers of any of the Siouan groups. The entire group now numbers about 40,000.

Related Subjects. For a description of various Siouan tribes see the following articles in these volumes:

Assiniboin	Quapaw
Osage	Sioux
Ponca	Winnebago

SIOUX, *soo,* or **DAKO'TA,** a large and powerful tribe of North American Indians of Siouan stock, who formerly occupied the region extending from the Arkansas River in the south to the western tributary of Lake Winnipeg in

the north, and west nearly to the Rocky Mountains. In the War of 1812 they aided the British. In 1837 they ceded all their lands east of the Mississippi to the United States, and in 1851 they ceded 35,000,000 acres west of the Mississippi for $3,000,000. The government failed to carry qut the provisions of the treaties, and this caused a general uprising of the Sioux in 1862; nearly 1,000 settlers were killed before the Indians were finally subdued. All of the Minnesota Sioux were then removed to Dakota reservations.

Some of the bands settled in the Black Hills, and when gold was discovered there the United States tried to purchase the tract. Sitting Bull, Spotted Tail and Red Cloud visited Washington in 1875, but President Grant was unable to persuade them to sign a treaty. In June, 1876, an exploring expedition under military guard was attacked in the Black Hills, and a severe battle followed in which General Custer and all of his immediate command were killed. After several encounters the Indians were beaten, and later were pardoned and returned to their Dakota reservation. Another outbreak in 1890 was quelled by General Miles.

The Sioux represent the highest type of North American Indians in physical courage and intelligence. Several books and papers printed in their language have been published. They are now settled on various western reservations and number about 22,000. These Indians showed their loyalty in 1917 by enlisting in great numbers in the volunteer army. Their chief, too old to fight, was made a vice-president of the Red Cross Society.

Related Subjects. The reader is referred to the following articles in these volumes:

Custer, George Armstrong	Miles, Nelson Appleton
Indians, American	Siouan Indians
	Sitting Bull

SIOUX CITY, Iowa, the county seat of Woodbury County and the second largest city of the state, ranking next to Des Moines. It is situated on the Missouri River, the western state boundary, at the mouth of the Big Sioux River, 100 miles north of Omaha and 156 miles northwest of Des Moines. The city is served by the Chicago, Burlington & Quincy, the Chicago & North Western, the Chicago, Milwaukee & Saint Paul, the Saint Paul, Minneapolis & Omaha, the Great Northern and the Illinois Central railroads. River boats handle freight between this and other river towns. The population, which was 47,828 in 1910, had increased to 57,178 in 1916 (Federal estimate).

Sioux City has an area of forty-three square miles, which is greater than that of any other Iowa city, and it is built upon low lands and bluffs along the river. The chief features of the city are Stone Park (800 acres), a Federal building erected in 1896 at a cost of $300,000, a $750,000 county courthouse, a Carnegie Library, the Y. M. C. A. building and the Union Depot. Important among the institutions are Morningside College (Methodist Episcopal), Trinity College (Roman Catholic) and a number of hospitals. The leading industrial establishments include railroad shops, stockyards and meat-packing plants, planing mills, brick and tile plants and manufactories of farm implements. There is an extensive wholesale trade.

The place was settled about 1853 and was incorporated in 1856, and a year later it became a city. In 1910 the commission form of government was adopted. During its early years Sioux City was the outfitting place for prospectors going to the Black Hills, and was a government post for expeditions against the Indians. It is named for the native Indian tribe, and contains the grave of War Eagle, a famous Sioux chieftain. W.E.H.

SIOUX FALLS, S. D., the county seat of Minnehaha County, and the largest city of the state. In 1910 it had a population of 14,094; this had increased to 16,499 (Federal estimate) in 1916. Among the foreign-born, Scandinavians and Germans predominate. Sioux Falls is situated on the Big Sioux River in the southeast corner of the state, 259 miles north and west of Omaha and 317 miles southwest of Minneapolis. Railroads entering the city are the Chicago & North Western, the Chicago, Milwaukee & Saint Paul, the Chicago, Rock Island & Pacific, the Chicago, Saint Paul, Minneapolis & Omaha, the Great Northern and the Illinois Central.

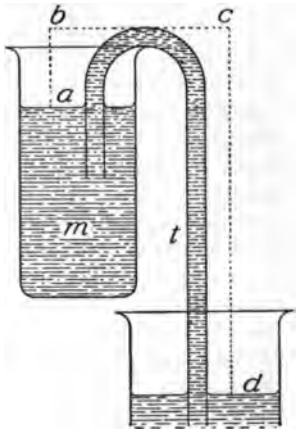
Sioux Falls is built upon rolling prairies and has an agreeable and healthful climate. Many of the public buildings are built of a native pink jasper, giving the city an unusually attractive appearance. Prominent structures are the Federal building, reconstructed in 1913 and valued at $470,000, the fine county courthouse, the Carnegie Library, the Masonic Temple and several churches of real artistic merit. The city contains the Sioux Falls College (Baptist), All Saints School (Episcopal school for girls), the Lutheran Normal, McKennan and Sioux Falls hospitals, the State Children's Home and the state penitentiary. Sherman (35 acres),

Phillips' (21 acres) and McKennan (19 acres) parks and the rapids of the river are among the interesting features of the city.

Sioux Falls is surrounded by a rich farming and stock-raising country, of which it is the commercial center. In the vicinity are large quarries of jasper or granite, used locally and shipped for building purposes. Water power furnished by the river, which drops at this point nearly 100 feet in a half mile, is utilized by manufactories. The leading industrial establishments are meat-packing plants, a biscuit factory, quarries and flour mills.

The first permanent settlement was built about 1857. The place was incorporated as a village in 1877 and became a city in 1883. It adopted the commission form of government in 1909, and owns the water system. L.M.G.

SIPHON, *si'fahn,* a bent tube with two unequal arms, used to carry a liquid from a higher to a lower level. In the accompanying figure the liquid (*m*) is forced through the tube (*t*) by the pressure of the air on the surface (*a*), which amounts practically to fifteen pounds to the square inch. As long as the pressure at *a* is greater than the weight of the column of water (*a b*), or until the surfaces (*d a*) are the same level, or *a b* equals *c d*, the flow will continue. Theoretically, a liquid will not flow through a siphon when the highest point in the tube is thirty-three feet above the level of surface *a*, because the pressure of a column thirty-three feet high is equal to the pressure of the atmosphere. In practice, however, the highest point cannot exceed thirty feet, and a much better flow is secured if it is not more than twenty-six feet.

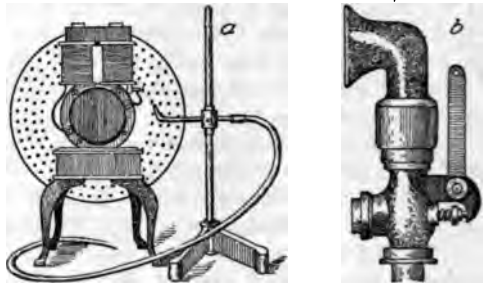


PRINCIPLE OF THE SIPHON

The tube (*t*) is the siphon; explanation of the physical law involved appears in the text.

The principle of the siphon is employed on a large scale in aqueducts for carrying water over hills, but in such cases the flow is increased by the use of pumps. The so-called siphon bottles used in mixing drinks are operated by compressed air or gas.

SI'REN, an instrument designed originally to measure the number of vibrations in a musical tone of a given pitch. The original form of siren consists of a circular disk perforated with one or more circular rows of oblique holes, and so mounted that it revolves close to another disk perforated with corresponding holes sloping in the opposite direction. The stationary disk is connected with a bellows or some other device by which compressed air, gas or steam is forced through its holes. When the holes in the revolving disk are opposite those in the stationary disk a puff of air escapes.



TWO OF THE SIRENS

The figures *a* and *b* are referred to in the text.

As the velocity of rotation increases, the puffs become more frequent until a clear, continuous sound is produced. The more rapid the vibration the higher the pitch. For instance, if there were thirty perforations in the disk, and it revolved fifteen times per second, there would be 15 x 30 or 450 puffs or vibrations per second. Thirty revolutions per second would give 900 vibrations, and so on. The revolving disk is connected with a system of clock work which registers the number of vibrations per second, and by use of a siren of this pattern the number required for any pitch can be easily determined (see *a* in the figure). A more recent pattern makes use of two perforated cylinders, one within the other, in place of the disks. The outer cylinder revolves.

Very large sirens are used for fog signals at lighthouse stations. Steam is employed in place of air, and a large trumpet-shaped horn (*b* in figure) is used to direct the sound. Some of these fog horns, as they are called, can be heard twenty-five or thirty miles. They produce low tones that carry a long distance.

SIRENS, *si'renz,* THE, in Greek mythology, two maidens who lived on an island and by their exquisite singing enticed mariners to their shore, where they remained, forgetful of home, of friends and of duty until they died of starvation. Ulysses was warned by Circe of the danger

from the Sirens, and he stopped the ears of his companions with wax. He himself wished to hear the music, but he had himself strapped to the mast of his vessel so that he could not yield to the charm if he wished to. See ULYSSES.

SIRIUS, *seer'i us,* THE DOG-STAR, the brightest star in the heavens and one of those nearest to the earth. It is still so distant, however, that its light takes more than eight years to reach the earth. A line drawn eastward through Orion's belt points at the dog-star, the head of Canis Major. It is a star of first magnitude, and radiates forty-eight times as much light as the sun. A companion star to Sirius was discovered in 1862, accounting for the apparent motion of Sirius in a small orbit. The companion gives out one ten-thousandth part of the light of Sirius, but has a mass of two-fifths its size.

SIROCCO, *si rok'o,* the Italian name given to two distinct types of southeast winds, common to countries bordering the Mediterranean on the north. Both winds are warm because they come from warm regions, but one is a damp wind that usually heralds rain, while the other is dry and laden with dust from the Sahara Desert far to the south. When this type of sirocco blows the sky is dark with fine sand which burns the skin and parches the throat. It is the scourge of Sicily, and is similar to, though less violent than, the simoom (which see) of the desert.

Related Subjects. The reader is directed to the article WIND and to the list of related articles there given.

SISAL, *se'sahl,* or *si'sal,* also called GRASS HEMP, is a tall, tropical plant whose swordlike leaves yield a valuable fiber. The plant is a native of Yucatan, Mexico, and is also cultivated to some extent in Florida, the Bahamas, the West Indies and parts of Central America. It belongs to the same family as the century plant (which see). From Progreso, the chief port of Yucatan, a town which exports more sisal than any other city in the world, the United States receives yearly 200,000,000 pounds of fiber, utilized for making binding cord, cordage, coarse cloth, hammocks and bags.

The process of fiber gathering begins with cutting the leaves at the base and removing the spine from the top. They are then fed to machines which strip off the pulp, leaving the yellowish-white, straight fiber. The leaves, which are four or five feet long and about one-third of a foot wide, yield not over four per cent of their weight in fiber, and it takes about 1,000 leaves to produce fifty pounds. The average yield of fiber per acre is about one-half ton.

SISTERS OF CHARITY. See CHARITY, SISTERS OF.

SISTERS OF MERCY. See MERCY, SISTERS OF.

SISTINE, *sis'tin* or *sis teen',* **MADON'NA.** See MADONNA AND HER BABE; RAPHAEL SANTI.

SISYPHUS, *sis'i fus,* a mythical king of Corinth, in ancient Greece. He was one of the most crafty of men, and his schemes puzzled even the gods. When Jupiter carried off Aegina, Sisyphus told her father who had done the deed, and in consequence Jupiter sent Death to punish the informer. But Sisyphus outwitted Death and bound him in fetters, so that there was great rejoicing all over the earth, for no man died. Pluto set Death at liberty, and Sisyphus was given into the hands of Death. With his dying breath Sisyphus begged his wife not to bury his body, and when he had gone to Hades he complained to Pluto of the mistreatment, and begged permission to go back to earth and punish his wife for her neglect. Pluto consented, and as soon as Sisyphus was again in his own house, he refused to return. Mercury, however, led him back, and when Pluto had him once more in Hades, he condemned him thereafter to the task of rolling up a high hill a large stone that ever rolled down again.

SIT'KA, a town in Alaska, originally the seat of government under the Russian régime, and until 1906 the capital of the territory, under the United States. It is situated on the western coast of Baranof Island (see map, page 136), in a mountainous region. Juneau, the present capital, is 160 miles northeast, and Seattle is 1,130 miles south. The place is the outgrowth of a Russo-American trading station established in 1799, which was then called Archangel; its history as a permanent settlement dates from 1804. Sitka has an agreeable climate, and the winters are not severe. The chief industries of the place are lumbering, mining and the canning of salmon. It is the seat of the Alaskan Agricultural Experiment Station and of the Coast Survey Magnetic Base Station, and the headquarters of the Episcopal bishop of Alaska. Among the notable features are the Sheldon Jackson Museum, maintained by the Presbyterian Mission, the Russo-Greek Church, built in 1816, government public schools and an industrial school for natives (Presbyterian). Population, 900 natives and 160 whites.

SITTING, *sit'ing,* **BULL** (1837-1890), an American Indian chief, born somewhere in the territory now comprising North and South Dakota. His childhood name was SACRED STAND, but when in his fourteenth year he killed and scalped his first victim he was called Sitting Bull, to show that he approached in power his father, Jumping Bull. As a prominent chief of the Sioux Indians, he led his tribes in numerous raids during the War of Secession, and though driven out of his territory into Yellowstone Park, was not subdued until 1866. In that year he pretended to accept peace, but in reality secretly led many attacks on settlements. General George A. Custer with a picked force of cavalrymen was sent against him, but in June, 1876, Sitting Bull and his tribe massacred the whole company on the Little Big Horn River.

The chief then fled to Canada, but was allowed to return in 1881. He immediately began to incite rebellion among the redmen, and in 1890, when the Indians were excited over the report of a Messiah coming among them, he aroused so much hatred among the warriors that the government ordered his arrest. While resisting this order on December 15, 1890, he was killed by the Indian police. He was a natural enemy of the whites, and his entire career was one of secret or open murder.

SIUT, or **SIOUT,** *se oot'* (also written ASSIUT and ASYUT), the capital of the province of Siut and the principal town of Upper Egypt, is situated about 248 miles by rail south of Cairo, on the west bank of the Nile River and on the Nile Valley Railroad. Siut is the official residence of the governor of Upper Egypt. Though it is located at the head of the caravan route connecting with the Libyan and Sudan oases, it is of less importance as a trading center than formerly because of the development of new commercial routes. In the production of pipe bowls and pottery, however, the town has long been famous; the people also make tulle shawls of a high grade. The town has substantial houses, a college and several fine mosques, and in the vicinity there are numerous ruins of ancient Egyptian structures. A large barrage was recently constructed in the river at this point for irrigation purposes (see EGYPT, subhead *Agriculture,* page 1967). In 1914 the town had an estimated population of 42,750.

SIVA, *se'va,* the third god of the Hindu triad, Brahma, Vishnu, Siva. He is represented with five heads and three eyes. He carries the Ganges on his head, wears a necklace of human skulls and carries a trident or pole supporting a skull and one or two human heads. His color is black, fitting a destroyer, and his weapons are an ax, a thunderbolt and a bow. He either sits on or is clothed in a tiger-skin, or may be clothed in a deerskin with a deer in one hand. He has one thousand names.

SIX'TUS, the name of five Popes of the Roman Catholic Church, of whom the most important were Sixtus IV and Sixtus V.

Sixtus IV, born in 1414, was of humble family, but by his undoubted ability won promotion in the Church until, in 1467, he attained the rank of cardinal. Four years later he was elected to the Papal chair on the death of Paul II in 1471. The most famous memorial to his reign is the Sistine Chapel in the Vatican, though he also beautified Rome in other ways. He was much concerned in political intrigues, largely because of the actions of different members of his family, whom he had elevated to high positions. This advancement of his relatives is probably the most regrettable circumstance of his career as Pope. He died in 1484, having occupied his high office nearly thirteen years.

Sixtus V, Pope from 1585 to 1590, was, like Sixtus IV, of humble parentage, and like him was a member of the Dominican brotherhood. He was born in 1521, was created bishop in 1566 and cardinal in 1570. Even in the latter high office he had yet come little before the public and there was much doubt at his election as Pope in 1585 as to what policies he would pursue. From the first he showed great vigor, firmness and zeal for reform, directing his efforts especially against the bands of robbers and outlaws who infested the country about Rome. So effectively did he deal with these that his name remains until the present the synonym for speedy justice against wrongdoers. He strove to advance the cause of the Church as against the newly-risen Protestantism, but reproved Philip II for the excess in severity which was practiced in Spain in the name of the Inquisition. It was he who blessed the Spanish Armada when it went to its destruction in the campaign against England, and who erected the Vatican Library. A.MC C.

For a list of the Popes see the article POPE, in which is also included a detailed account of the method of election to the Papal chair.

SKAGERRACK, *sgahg'er rak,* also spelled SKAGER-RAK and SKAGERRAK, is a broad arm of the North Sea, 130 miles in length, which divides Norway and Sweden at the extreme south and separates those two countries from Jutland

on the south (see colored map, following page 2092). It is the connecting link between the North Sea and the Cattegat, the two forming the entrance into the Baltic Sea. Along the shores of Jutland there is no secure anchorage, for the coast is lined with dangerous sand banks,

LOCATION MAP

but along Norway, eighty miles away, there are several good harbors, the water being over 2,000 feet deep. In the spring of 1916 a battle between the German and British fleets was fought in the Skagerrack (see WAR OF THE NATIONS).

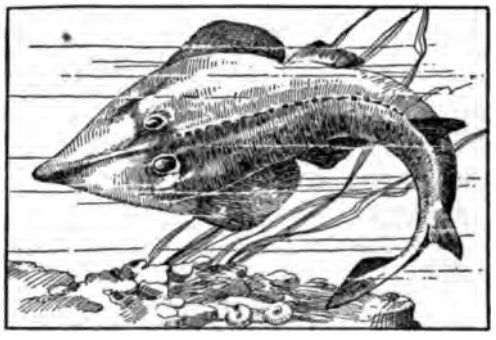
SKALDS, *skawlds,* among the Scandinavian races, the name given to the poets who in a measure corresponded to the bards of Great Britain. They lived at the court of some prince, and sang the praises of living heroes and warriors or of the ancestors of their patron. The folk poets who composed roughly and without rules were not reckoned among the skalds, who had to be well educated and versed in all the forms and traditions of Norse poetry. Skalds flourished in Norway as early as the ninth century, and the latest ones lived in the latter half of the thirteenth.

SKAT, *skaht,* a game of cards of German origin, supposed to have been invented in 1817 by a lawyer in Saxe-Altenburg. It may be played by three or four persons. When there are four the dealer takes no part in the game though he shares the winnings and losses of the three players. Skat is the most complicated and scientific card game known. It is usually played for money, but the skill required considerably reduces the element of luck.

Thirty-two cards, with four suits, are used. The four suits correspond to hearts, spades, clubs and diamonds but are called respectively *Roth* (red), hearts; *Grün* (green), spades; *Eichel* (acorn), clubs; and *Schellen* (bells), diamonds. The eight cards of each suit run from seven up to ace. The suits have different values, clubs being highest, followed in order by spades, hearts and diamonds. The dealer gives three cards to each player, then four, then three again, making a total of ten cards, and he puts aside two cards for *skat.* Knaves are regarded as trumps, and they take all other trumps. Counting is very complicated, each suit having a different value. Manuals of card games give full particulars of the game of skat, which has never become very popular in America, owing to its complications and difficulties.

Consult Foster's *Skat Manual;* Hoyle's *Games.*

SKATE, a flat-bodied fish, belonging to the ray family. It has a pointed snout, expanded pectoral fins, which form with the body a round disk, and a slender tail that has lost its function of locomotion and is used only as a rudder. Skates are usually found on sandy bottoms not far from shore. They feed on mollusks, crustaceans and fishes. Most species are edible. The *common skate* of the Atlantic coast of North America is a foot or two in length. The *barn-door skate* is larger, reaching



SHOVEL-NOSED SKATE

four feet in length, and there is a species off the California coast that sometimes grows to be six feet long. Another well-known species is the *shovel-nosed skate.* The egg cases of the fish are sometimes picked up on shore. They are popularly called "mermaids' purses." A deep-sea skate has been discovered near the Faroe Islands in the North Atlantic.

SKATES AND SKATING. A modern skate is a steel blade affixed to a wooden or metal base. It is fastened to the shoe by means of straps, clamps, or screws. There are several well-known types. The *club skate* is entirely of metal and is clamped on the foot. Its blade is rocker shaped. The *Hudson River skate* has a long and narrow straight blade, wooden top and straps. The *Norwegian skate,* introduced

from Norway, is similar, but is very light in weight and is screwed to the sole of a special skating shoe. The *hockey* combines the club and Norwegian types in a short, thick, straight-bladed skate screwed to the shoe. It is used in speed skating, while the club skate is better fitted for fancy or figure skating. The substitution of wheels for the blade has resulted in the roller skate, which does not require ice but can be used on any smooth, solid surface.

For centuries skating has been a popular sport among people of Northern countries. It was earliest developed by the Norsemen, Swedes, Danes, Finns and Dutch. The great antiquity of the sport is shown by its mention in the earliest known examples of Scandinavian literature. The primitive skater tied a bone to his foot and used a stick to aid him in his progress over the ice. During the past century, races and matches have become common in Europe and North America. National associations foster the sport and arrange for national and international contests. As one of the most healthful and invigorating of sports, skating is attracting more enthusiasts every year. In the winter of 1915 it became the most popular pastime in large cities, where rinks were constructed on roofs and in hotels to take the place of the dance halls which had been the principal amusement centers of the previous season.

Consult Browne's *Handbook of Figure Skating.*

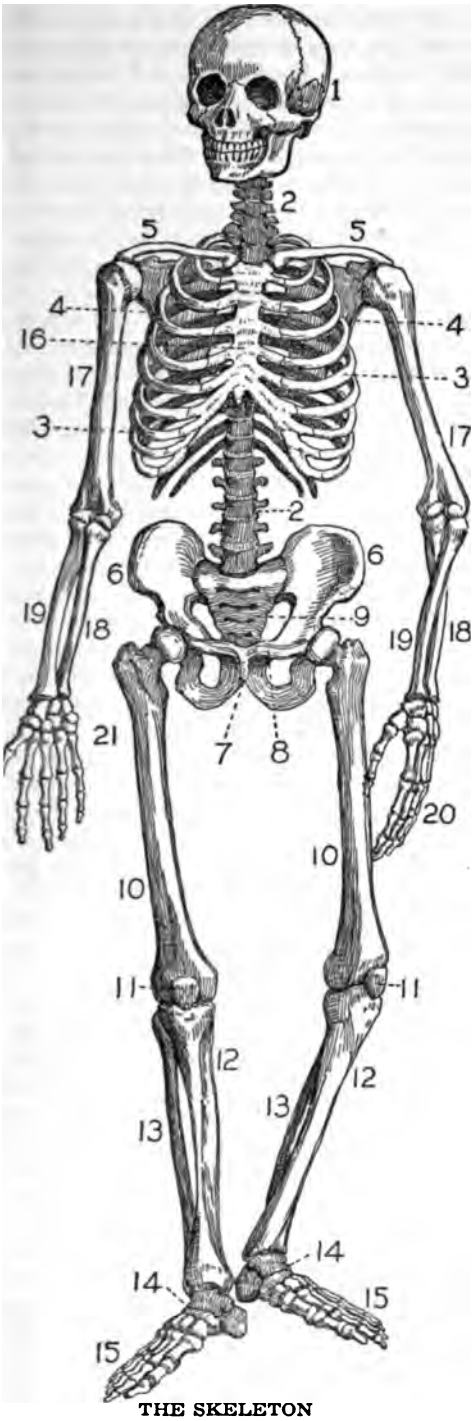
SKEAT, *skeet,* WALTER WILLIAM (1835-), an English scholar and philologist, whose edition of Chaucer is universally recognized as standard. Born in London, he received his schooling at Kings College, Highgate Grammar School, and at Christ's College, Cambridge. He became a fellow of Christ's College in 1860 and in 1878 was elected professor of Anglo-Saxon. Skeat's most important work was as scholar and editor, not as teacher. His researches in philology, especially Anglo-Saxon and Middle English, gave him an eminence which became more marked on the publication of his editions of Chaucer's works and of Langland's *Piers Plowman.* Of his many other works the most important is the *Etymological English Dictionary,* the most comprehensive and authoritative book in its field. Skeat shares with Frederick Furnivall the distinction of being chiefly responsible for the revival of England's interest in its early literature.

SKEENA, *ske'na,* **RIVER,** one of the many short streams which flow westward across British Columbia into the Pacific Ocean. Its course is about 335 miles long, and its drainage basin covers an area of 19,300 square miles. Though not a large river it is economically of great importance, for it is one of the greatest fishing grounds for salmon in the world, and with the exception of the Fraser River fisheries, is the most valuable in British Columbia. The halibut catch in Hecate Strait, off the mouth of the Skeena River, is the largest in the Dominion of Canada.

The Skeena rises in the north-central part of British Columbia, and at one point in its upper course is less than twenty miles from the headwaters of the Finlay, the principal tributary of the Peace River. Skirting the northern end of the Firepan and Babine mountains, which break the surface of the Interior Plateau, the Skeena flows in a general southwesterly direction, cuts a path across the Coast Range and empties into the sea about ten miles south of the city of Prince Rupert. W.B.

SKEL'ETON. The bones of all vertebrate animals are joined together to form a symmetrical, flexible core which gives shape to the body and constitutes a protecting framework for the vital organs. In man, the highest of the vertebrate creatures, this bony core, or *skeleton,* is a marvelous example of adaptation to human needs. There are about 200 separate pieces to the skeleton (see accompanying diagram), all nicely fitted together and held in place by strong bands of flexible tissue (see LIGAMENT). These pieces, the bones, are grouped into two main divisions, the *axial* and the *appendicular* skeletons.

The axial skeleton is made up of the bones of the head, neck and trunk. Its nucleus is the spine (also called spinal column and backbone), which forms an axis for the support of the other parts of the body. In the upper portion are twenty-four separate bones called *vertebrae,* seven of which *(cervical)* are in the neck, twelve *(dorsal)* in the region of the chest, and five *(lumbar)* in the loins. To the dorsal vertebrae are attached the ribs, there being twelve on each side. The upper ribs are fastened in front to the breastbone, or *sternum.* Below the last lumbar vertebra is the *sacrum,* which consists of five separate bones in infancy, but of one solid structure in adulthood. At the tip of the spinal column is the *coccyx,* also a single bone in maturity, but consisting of four bones in early life. The sacrum and coccyx are regarded as continuations of the vertebral column. This central axis is one of



THE SKELETON

1. Cranium
2. Vertebrae
3. Ribs
4. Scapula or shoulder blade
5. Clavicle or collar bone
6. Hip bone
7. Coccyx
8. Pubes
9. Sacrum
10. Femur or thigh bone
11. Patella or kneecap
12. Tibia
13. Fibula
14. Metarsal bones
15. Phalanges
16. Sternum
17. Humerus
18. Ulna
19. Radius
20. Phalanges
21. Metacarpal bones

the most marvelous structures of the body, for it possesses just the right combination of rigidity, flexibility and elasticity.

The parts of the appendicular skeleton are attached to the central axis in such a way as to afford great freedom and variety of movement. This portion of the framework consists of the arm bones and the shoulder girdle *(pectoral arch)* and the leg bones and hip bones *(pelvic arch)*. The pectoral arch is made up on each side of a collar bone and a shoulder blade; the hip bones, or pelvic arch, of a single structure called the *os innominatum* (bone without a name). As may be seen by the diagram, the collar bone on each side is attached to the shoulder blade and also to the breastbone, while the bones of the lower limbs join the pelvic arch in the hip joints. The pelvic arch in turn is attached to the lower part of the backbone. Thus all parts of the framework are joined together, and each part has its work in the body mechanism. W.F.R.

Related Subjects. The various parts of the skeleton are discussed in more detail under the following headings:

Arm	Foot
Bone	Hand
Face, The	Head

The bones of the arm, foot, hand and head are fully illustrated and named under those headings. See pages 372, 2253, 2681, 2738.

SKI, or **SKEE**, *ske*, a Norwegian name for wooden runners from three to four inches broad and from five to ten feet in length, used by men, women and children of northern countries for walking over snow and for coasting down snow-covered hills. Skiing as a sport is extremely healthful exercise, and numerous ski clubs exist in all northern countries where winter snows are plentiful. Contests to develop skill are held in many places; these include long and short runs, but the greatest interest always attaches to feats of jumping. The contestants glide rapidly down a snow-covered hill, and at a certain point in the descent they are projected into the air by a sharp elevation in the path, alighting at a great distance down the hillside. A jump of 130 feet is not unusual.

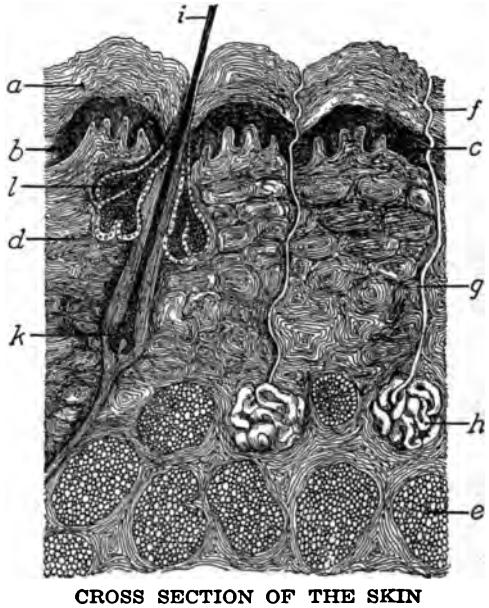
The infantry soldiers of Sweden and Norway are equipped with skis and accomplish very long marches over the snow-covered ground. In forest lands skis are not as useful as the

ordinary snowshoe, but in open country they possess great advantages, especially in speed. The ski is attached to the feet by means of straps which allow the heel to rise and fall as in walking, but keep the toes firmly fixed to the wood. In walking uphill a zigzag course must be pursued, but downhill the motion may become an extremely swift slide, steering being done by means of a staff.

Consult Rickmer's *Ski-ing;* Fulton's *With Ski in Norway and Lapland.*

SKIMMER, *skim'er,* a name sometimes applied to the SCISSORBILL (which see).

SKIN. We usually think of the skin as that part of the body-covering which we can touch and see. As a matter of fact, the top skin is only a thick, protecting layer which covers what is known as the true skin, or *dermis. Dermis* is



CROSS SECTION OF THE SKIN
(Greatly magnified.)

(*a*) Scarf skin, or dead epidermis; (*b*) growing layer of epidermis; (*c*) layer of cells filled with coloring matter; (*d*) true skin; (*e*) fatty tissue; (*f g h*) sweat gland and duct; (*i k*) hair with follicle and papilla; (*l*) sebaceous gland.

derived from the Greek word for *skin,* and is compounded with *epi,* meaning *over,* to form the word *epidermis.* The latter is the name for the upper layer, which is also called *cuticle.* An examination of the accompanying diagram will show the structure of the skin layers.

The Epidermis. The top layer is made up of countless cells placed side by side like the paving stones in a street, but instead of one compact row there are perhaps twelve or fifteen rows, arranged one above the other. These cells grow from the bottom up. In the lowest row they are columnlike in shape, and their long axes are perpendicular to the cells of the under skin. Above are several rows of roundish cells, which grow flatter and flatter as the surface is approached. They also become drier as they are pushed upward by new cells below, and when the surface is reached they are shed off in thin flakes. This is the "dead skin" one rubs off with the towel in bathing. In the deeper cells of the epidermis are found nerves, but there are no blood vessels in this layer. That is why a man can pass the razor over his face without discomfort. A cut which draws blood must be deep enough to reach the dermis. In the deeper layers is also found the pigment which gives color to the skin. Dark races have an abundance of pigment and white races little or none. It sometimes happens that exposure to the sun causes an increase of coloring matter in spots, and freckles result. Hair and nails are parts of the epidermis that have been excessively developed for special purposes.

The Dermis consists of a closely woven network of connective tissue, from one-sixteenth to one-eighth of an inch thick, within which are embedded blood vessels, lymphatics, nerves, glands and hair follicles. In its lowest part the dermis passes gradually into a loose network of fibers called *areolar subcutaneous tissue,* which allows the skin to move freely upon the parts below. On the outer surface of the dermis are innumerable elevations about one-two-hundredth of an inch in length, called *papillae* (from the Latin word for *pimple*). The papillae fit into tiny pits on the under surface of the epidermis, so that the two layers are firmly molded together. In the papillae are found the nerves that give the sensation of touch, and they are especially well developed in the inside of the hands, where they are arranged in rows. The fine ridges on the balls of the fingers and thumb—unalterable identification marks—show where the epidermis falls in between adjacent rows of papillae. When a small group of papillae becomes overdeveloped and projects above the surface of the epidermis, a wart forms. People become wrinkled when the fat and other soft parts beneath the dermis are absorbed and the skin does not shrink at the same rate. Building up fat is therefore the proper way to keep the skin smooth.

The Glands. These are among the most important organs of the skin. There are two kinds, those that pour out sweat, or perspiration, and those that discharge oil. The sweat

glands are minute tubes that extend from the surface of the body down to the subcutaneous tissue. There are over two million of them, distributed over the surface of the entire body, but most abundantly on the palms, the soles and the forehead. By means of these glands the skin performs a twofold function: it excretes waste matter, and also regulates the heat of the body, for the sweat, as it evaporates, cools off the surface. The oil *(sebaceous)* glands, which generally open into hair follicles (see illustration on page 2659), secrete an oily substance that keeps the hair smooth and glossy and prevents the skin from becoming too dry. So-called blackheads form when the tiny openings of the face oil glands become filled with dirt.

Care of the Skin. The skin must be washed frequently to keep the glands in good working order. Neglect in this matter will cause the pores (the mouths of the glands) to become clogged. A fresh, rosy complexion is always an indication of health and cleanliness, while pimples and other unsightly blemishes usually tell a story of unhygienic living. One should avoid tight clothing and indulgence in rich foods and unwholesome stimulants if a clear skin is desired. A sensible régime in regard to food, ventilation, dress and bathing is of far more value than the practice of using cosmetics. In regard to bathing one should exercise moderation in the matter of hot water and soap, for if these are used too lavishly the skin is liable to become dry and scaly.

Skin Grafting is the transference of living skin to an area made raw by a burn or unhealed sore or ulcer. There are several methods employed; the most common consists in placing superficial layers of skin on the wound. Sometimes, however, the entire thickness of skin, including subcutaneous fat, is laid on the sore spot. If the operation is successful the new graft causes the wound to heal. Skin grafting has often been the means of saving life, and it has sometimes been made possible only through the heroism of a person willing to give a portion of healthy skin. C.B.B.

Related Subjects. The following articles in these volumes present various phases of the subject. Among them are articles on skin diseases:

Baths and Bathing	Hygiene, subhead
Boil	*Personal Hygiene*
Dandruff	Itch
Eczema	Nails
Hair	Nervous System
Hookworm	Perspiration
	Touch

SKINNER, *skin'er,* OTIS (1858-), an American actor who has no superior as an impersonator of romantic rôles. His acting shows a blending of humor, sentiment and buoyancy that has made him an established star on the American stage, and his art has a finish that could come only from thorough training and long experience. Skinner, in fact, had the best of teachers, for he worked with Edwin Booth and Lawrence Barrett when they were in the height of their successful careers, and for five years (1884-1889) he played with Augustin Daly's company. Skinner was born at Cambridge, Mass. He made his first appearance as a professional actor in 1877, in Philadelphia, and played for two years in that city with the Walnut Street Stock Company. After leaving the Daly organization he was leading man for Madame Modjeska through several seasons. His greatest success of later years was *Kismet,* a play of the romantic type, but he also won praise for his work in *Cock o' the Walk* (1915-1916), a character comedy by Henry Arthur Jones. In 1917 he appeared successfully in *Mr. Antonio,* a play by Booth Tarkington.

SKU'A, the bird of prey of the ocean, a fierce, gull-like creature with a strong, hooked beak and brown and white plumage. It follows the gulls and terns of Arctic and Antarctic waters, taking from them the fish they

THE SKUA

have caught, and also devours smaller birds and their eggs. Skuas build their nests of sticks and grasses on the ground or bare rocks. The eggs are two in number, olive colored, with spots of brown or chocolate. The birds are artful in concealing their nests and fight savagely if they are discovered. See GULLS.

SKUNK, a common member of the weasel family, native to North America. It is stockily built, about the size of a large cat, with

a long, pointed nose and an arched back, short legs and a mincing gait. The fur, which is long, thick and shiny, is black, marked with prominent white stripes down the back and a white patch on the forehead. The long, bushy tail is black on top and white underneath. The skunk is distinguished by its peculiar means of defense, which is a pair of glands containing a fluid of strong odor that is ejected with considerable force when the animal is frightened. The skunk lives in a hollow tree, a burrow, or

THE SKUNK

under sheds, and feeds upon insects, mice, gophers, reptiles, squirrels, eggs and poultry. It makes its raids on the poultry yard at night and often does considerable damage. The Texas white-backed skunk and the striped skunk of the South are well-known and beautifully-marked species.

The skunk is one of the most valuable fur-producing animals in North America, about $1,500,000 worth of skins being sold annually. Skunk farms are maintained in Canada and some other localities and are proving profitable. Skunk grease is used in tanning leather.

Consult Coues' *Fur-Bearing Animals;* Holbrook's *Skunk Culture for Profit.*

SKY, a term applied to the apparent arch or vault of the heavens, that infinity of space surrounding the earth, the lower portions of which are the regions of winds, rain and clouds. Omar Khayyam, the Persian poet and philosopher, writes of the "huge, inverted bowl" which we call the sky.

The word is generally supposed to be of Anglo-Saxon origin and in ancient literature is variously written *skewes, skye, skiwes* and *skie.* In fair weather the sky is a clear blue color, but when clouds are present it is obscured and we cannot see into the vast space signified by the word. It is customary to speak of a dull or clouded sky; in reality it is not the sky that is dull or clouded, but the obscurity is caused by clouds that have come between earth and sky. The word *firmament* is sometimes used as referring to the sky, but this is hardly correct, as firmament is applicable only to the solar system as a whole and not to the sky in particular.

Poetry and literature of all ages contain many allusions to the sky, for it has always exercised an irresistible attraction. The expression, "laud him to the skies," is familiar, and is a synonym for extravagant praise. "A bolt from a clear sky" has long meant some event as unexpected as a lightning flash from cloudless heavens. The word is also used as a verb, especially applied to art exhibition. To "sky" a picture means to place it so high up on the wall that it cannot be seen plainly by people on the floor.

SKYE TERRIER, *ski ter'i er,* one of the smallest of the terriers, native to Northern Scotland and often kept as a house pet. It is a long-bodied, short-legged dog, from eight to ten inches high and about twenty-two inches long. Its coat is double, with an under layer of soft, short hair, and an outer one with long, stiff and straight hair. A black muzzle, rather long head and neck, erect or hanging ears, and a tail carried no higher than the back, characterize this little animal, which may vary in color from sand or mottled bluish-gray to

SKYE TERRIER

black. Two familiar species are the *Clydesdale,* or *Paisley,* with small, pointed, erect ears which give it an alert appearance, and the *Yorkshire,* still smaller, with very silky hair. Skye terriers are good rat hunters.

SKY'LARK. See LARK.

SLAG, a stonelike compound formed in the process of extracting metals from their ores. It contains silica, alumina, lime and various earthy substances, together with a small quantity of the metal from the reduction of which it results. In the improved methods of smelting, little of the ore remains in the slag, but for-

merly a large portion was wasted, and slags could often be smelted with profit. Various economical uses have been found for slag. When reduced to powder it is used in making mortar, and that containing phosphorus makes a good fertilizer. It is also cast into blocks which are used for roadbeds, and from iron slag an imperfect glass is manufactured from which vases and various small articles are made. In Europe melted slag is used to impart a glaze to bricks.

SLAN'DER, a story maliciously uttered with the intention of injuring, or tending to injure, the reputation or good name of another. Written defamation of character is termed *libel.* See LIBEL.

SLANG, a word which originally meant the jargon used by the vagabond classes, thieves, beggars and tramps, to conceal their meaning from other people. Authorities agree that the term must be connected with the verb *sling,* which is sometimes vulgarly used in such expressions as *to sling language,* for *to abuse.* To-day slang, as generally understood, includes colloquialisms and inelegant words, as well as phrases which have originated in the rude speech of vagabonds or the uneducated classes, or such words as have been intentionally perverted and given meanings which are whimsical, ironical or extravagantly figurative. Mere dialect peculiarities or idioms of some one locality or class of persons are not to be classed as slang, which of its very nature is a conscious substitution of an unconventional expression for the formal, correct mode of speech (see IDIOM).

Not by any means is all slang vulgar in its origin; much is adopted from the technical language of the trades or professions and applied figuratively to untechnical matters. Thus, the expression, "He's gone off on a sidetrack" clearly came from railroading, and is figuratively applied to a deflection from the main purpose. One might use the above sentence without being aware that it is slang. Many slang phrases are, however, taken directly from the speech of thieves and vagabonds, and carry the marks of their origin with them, and are to be avoided. Such, for instance, are *to douse the glim* for *to put out the light,* a *cove* for a *man,* or a *wipe* for a *handkerchief.*

Contributes to Language. There is much to be said in defense of one phase of slang. Every language must grow, must have new words added to it and new meanings attached to its old words; and of the means by which these changes are accomplished, slang is one of the more important. Particularly does it enrich the figurative side of a language, for metaphor is at the basis of most slang. To be sure, a very large proportion of slang words and phrases die out after a very brief existence. Nothing seems more utterly dead than the slang of a few years ago; but an occasional expression lives, rids itself of its vulgar connections, and fills a place in the language which has never been quite so exactly filled before. The word *tandem,* for instance, was originally university slang, and grew out of the humorous application of the word, which the dictionaries translate "at length," to space ideas as well as time ideas. Now the colloquial significance is no longer felt, and the word is regarded as correct literary English. Other words which have had the same history are *hoax, mob, blizzard, humbug* and *gerrymander.* Occasionally a word which had its origin in the very lowest ranks of society, among the professional thieves, meets with this same fate; thus the word *prig,* which meant a *thief,* has come through successive changes to denote a kind of person that no other word fitly describes.

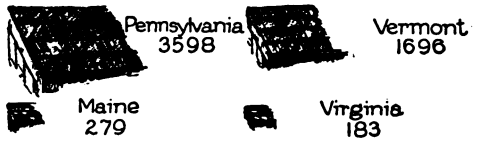
Its Dangers. On the other hand, there are dangers in the habitual use of slang. These words are not, for the most part, attempts to supply deficiencies in the language; they are revolts against propriety and purism, sometimes apt and striking, but as often not. In either case, they tend to narrow a person's vocabulary, to do away entirely with fine shades of meaning. The first time anyone said "That's a stunning gown," the figure was forceful and perhaps conveyed the idea better than any other expression could have done; but if "perfectly stunning" is applied to everything attractive, from a salad to a Beethoven sonata, the force is lost, and a number of adjectives are ignored which might far more accurately express the pleasure received. A.MCC.

Consult Ware's *Passing English of the Victorian Era;* Farmer and Henley's *Dictionary of Slang, Jargon and Cant.*

SLATE. In most modern schoolhouses we find blackboards of stone. They are usually of a dark gray or a purplish-brown color. They have a smooth, even surface and are pleasing to write upon. It may be that the roof of the schoolhouse is covered with the same sort of stone. Thin slabs of this stone are smoothed on both sides, cut into small sizes, enclosed in wooden frames and sold for school children to write on. This stone is slate, a rock com-

posed chiefly of quartz or silica and clay and changed into its present form by heat and pressure.

Slate splits into thin layers and varies in color from light gray to green, red, brown and almost black. It is of different degrees of hardness but all varieties are easily scratched with a knife. It is found in all localities where metamorphic rocks have been formed, and the layers are often tilted at various angles. It is one of the most durable rocks and withstands weathering as well as granite. The best varieties are used for blackboards, for covering roofs, for writing slates and for mantels.



A YEAR'S PRODUCTION
The four leading states which quarry slate.

Marbleized slate is made by painting the background on the stone and dipping it in water upon which the coloring matter has been spread, then baking the stone. Very beautiful designs are produced in this way. The most extensive slate quarries in the United States are in Pennsylvania, Vermont, Maine and Virginia. Little is quarried in Canada. The most important quarries of Europe are in Wales and Ardennes, France. The slate quarried yearly in the United States is valued at over five and a half million dollars.

Consult Dale's "Slate Deposits of United States," in *Bulletin No. 586,* United States Geological Survey.

Related Subjects. The reader is referred to the following articles in these volumes:

Cleavage	Metamorphism
Geology	Quarry and Quarrying

SLATER FUND, an endowment of $1,000,000, made in 1882 by John Fox Slater, a New England manufacturer, for the purpose of conferring a "Christian education on the lately emancipated population of the United States." For this gift Congress voted a resolution of thanks to Mr. Slater, and presented him with a medal. The fund was placed in charge of a board of trustees, and so well has it been administered that it now yields an annual income of about $80,000.

The fund has been devoted principally to the support of those negro schools which specialize in normal and industrial training, including the Tuskegee Normal and Industrial Institute, and the Hampton Normal and Agricultural Institute, both of first importance. The money is used to pay salaries of teachers, directors and principals, and for supplies and running expenses. An annual grant of $1,000 for three years, beginning in 1908, was made to the public school officials of Charleston, S. C., to support an industrial school for negroes in connection with the public school system, a notable extension of the activities of the foundation.

Consult Ayres' *Seven Great Foundations;* also reports of the United States Bureau of Education.

SLAVERY, *slayv'er i.* In the childhood of man our barbarous ancestors, when they fought their hostile neighbors, made no captives. They did not conquer their enemies; they destroyed them. So slavery, when it came, was a forward step in the march toward the brotherhood of man, for although it ignored the rights of fellow creatures it at least recognized their usefulness, their ability to benefit the world by their presence. Captive men and women did the rough work of a community, and their masters gained leisure time—chiefly time to be idle, but also time to think. Had the older system of slaying all enemies persisted, we might never have reached the state of society which gave us Abraham, Moses and David, Homer and the many artists of ancient Greece, and Cicero, Horace and Vergil.

But the slavery of those taken in war was a different thing from the enslavement of fellow citizens for debt or the trafficking in men and women of a lower state of civilization who could by no stretch of the imagination be considered enemies. And history records that while slavery of the first type ended gradually through economic and political changes, slavery for debt and slavery of the black race were destroyed by moral uprisings.

Slavery in the Ancient World. When Abraham made his covenant it applied both to Abraham's family and to him

that is born in the house, or bought with money of any stranger,

and slavery continued among the Hebrews until they themselves were carried away into captivity. But the laws of Moses provided that all slaves should be well treated, and that a Hebrew servant should go free after six years, and a foreigner in the year of jubilee, which occurred twice in a century.

The story of Ulysses' visit in disguise to the swineherd Eumaeus, in the *Odyssey,* teaches

us that in Homer's time slaves were kindly treated, but that they were purchased from pirates and were sometimes of higher birth than their masters. Later it was customary for men in poverty to sell their children or publicly abandon them, and for debtors to sell themselves for their debt; but Plato and his followers declared that one Greek ought never to make a slave of another. Like Aesop, who is said to have been a tutor, slaves could hold positions of responsibility, and could sometimes purchase their freedom.

In Rome slavery flourished as long as the legions continued their conquests. Wealthy men maintained large numbers of slaves recruited from war, piracy and a special slave trade, and some authorities believe that at the height of the empire there were three slaves to every single freeman. Slaves were often given their liberty and sometimes rose to greatness, as did Terence and Epictetus. The advent of Christianity had less to do with the end of Roman slavery than the stoppage of the sources from which slaves were drawn. There was in fact no sudden shift from slavery to freedom, but a gradual change into serfdom.

Modern Revival of Slavery. Just before the middle of the fifteenth century Portuguese explorers in Africa were given several black slaves in ransom for Moors whom they had captured, and the Portuguese began the capture and transportation of negroes into Europe. In 1516 Charles V of Spain gave permission to carry slaves into the colonies, and so profitable did the trade prove that several of the nations engaged in it. By the time of the American Revolution the British were carrying more than half of the blacks that were brought to the Western world.

Though Denmark was the first nation to decree the end of the slave trade, in 1792, it was in England that the great fight against it was begun. The English Quakers started the movement in 1729; their American brethren, in 1696. Through the efforts of Thomas Clarkson and William Wilberforce, the House of Commons passed a bill against the trade in 1792, but the Lords did not approve the step until 1808, in the very same month in which the United States prohibited the further importation of Africans.

The history of slavery in the United States can best be studied through the list of related topics given below. Franklin, Adams and Hamilton from the North and Jefferson and Madison from the South opposed it, and Washington, though he owned slaves, freed them in his will, previously declaring in his farewell address that it was among his "first wishes to see some plan adopted by which slavery in this country may be abolished by law."

In Haiti, where there were sixteen blacks and one mulatto to every white, the slaves revolted against the French in 1791 and established a republic. Great Britain freed all slaves in her colonies in 1833, and other European nations gradually followed. Most of the South American republics declared all men free from the beginning of their independent existence, but Brazil did not take the step until 1871.

Slavery has never ended in Mohammedan countries, and an illicit trade is still carried on in Africa. Dean C. Worcester, formerly Secretary of the Interior for the Philippines, claims that slavery still exists in remote sections of those islands. C.H.H.

Consult Merriam's *The Negro and the Nation;* Woodson's *The Education of the Negro Prior to 1861;* George's *Political History of Slavery.*

Related Subjects. The following articles in these volumes have a bearing on the subject of slavery. The majority deal with United States history, but a few have a more general significance:

Abolitionists
Brown, John
Compromise of 1850
Confederate States of America
Crittenden Compromise
Dred Scott Decision
Emancipation Proclamation
Fugitive Slave Laws
Garrison, William Lloyd
Helots
Kansas-Nebraska Bill
Lecompton Constitution
Lincoln, Abraham
Mason and Dixon's Line
Missouri Compromise
Phillips, Wendell
Reconstruction
Serfs
United States, subtitle *History*
War of Secession
Wilberforce, William
Wilmot Proviso

SLAVONIA, *sla vo' ni a.* See CROATIA AND SLAVONIA.

SLAVS, *slahvz,* or *slavz,* or **SLAVONIANS,** *slah vo' ni anz,* the general name of a group of peoples forming a branch of the Aryan family, who live chiefly in Eastern Europe and Siberia. They number approximately 184,000,000, according to recent estimates, and include Russians, Poles, Wends, Czechs (Bohemians and Moravians), Slovaks, Slovenians, Croats, Serbians, Bulgarians, Montenegrins and the peoples of Bosnia and Herzegovina. They are somewhat shorter than the average Aryan, and have broad heads, pale white, swarthy or light brown skin, and brown, gray or black eyes. For many centuries the Slavs, who were slower in developing than most of the other peoples of

Europe, were greatly oppressed, and their progress toward freedom and self-government is one of the notable movements of recent history. The Bulgarians, Serbians and Montenegrins, for instance, have been freed from Turkish oppression, and the Russians have overthrown one of the most despotic governments known in history.

Related Subjects. For details concerning the various Slav peoples, consult, in these volumes, the following articles:

Austria-Hungary	Czech
(racial map on page 504)	Montenegro
Balkan Peninsula	Poland
Bosnia	Russia
Bulgaria	Serbia
Croatia and Slavonia	Slovaks

SLEDGE, *slej,* a means of conveyance, in which the body is mounted on runners instead of wheels, and so of effective use only when the ground is covered with snow. When crudely made, they are called sledges, or sleds, as the dog sledge of the Eskimos, the reindeer sledges of Lapland, or the bobsleds of America. With a body fashioned artistically they are known as *sleighs* all over the world where there is snowfall. In the United States and Canada light and graceful sleighs are also known as cutters.

SLEEP, the state during which the nervous system renews the energy expended during the waking hours. The beneficent effects of sleep are known to every one, and no one will say that this rest period of tired humanity is overpraised by Shakespeare in his familiar lines from *Macbeth:*

> . . . . . the innocent sleep,
> Sleep that knits up the ravell'd sleeve of care,
> The death of each day's life, sore labor's bath,
> Balm of hurt minds, great nature's second course,
> Chief nourisher in life's feast.

Coleridge, too, in *The Ancient Mariner,* says of sleep that

> . . . . . it is a gentle thing,
> Beloved from pole to pole.

Throughout the active hours of the day energy is used up faster than it is stored and the tissues are worn faster than cells are formed to repair them; therefore both the mind and body need periods of rest. The most complete rest is found in sleep. The conscious activities of the mind cease, the heart beats more slowly, the respiratory movements are less frequent and the muscles are relaxed. An infant sleeps most of the time; a young child needs twelve hours of sleep out of the twenty-four, while eight hours is ordinarily sufficient for the adult. Sleep at night is more refreshing than that in the daytime. It is deepest during the second hour after going to sleep, and the nervous system receives a greater shock if the sleeper is awakened during this hour than if at any other time. Insomnia, or chronic sleeplessness, is a distressing ailment which should never be neglected.

Sleeping Porches. The lungs call for pure air, and sleep is most refreshing when the sleeper is supplied with an abundance of pure air. Tuberculosis and other lung diseases are frequently cured by sleeping in the open air. The most sanitary of modern dwellings are provided with sleeping porches which are so located as to seclude the occupants from view, and so protected with screens as to keep out flies and mosquitoes. With proper protection in the way of bedding and night robes, these porches may be occupied throughout the year.

Consult Powell's *Art of Natural Sleep;* Bruce's *Sleep and Sleeplessness.*

Related Subjects. The reader is referred to the following articles in these volumes:

Baby	Heating and Ventilation, subtitle *The Ventilating Problem*
Dreams	
Insomnia	
Somnambulism	

SLEEP'ING SICK'NESS, a fatal disease occurring in the equatorial districts of Africa, so called because in the last stages the victim passes into a state of heavy drowsiness which terminates in coma and death. The disease is caused by a minute animal parasite, the carrier of which is the tsetse fly. The early symptoms are irregular fever, headache, inability to sleep and weakness. The glands all over the body are enlarged, and a red eruption appears on the skin. As the disease progresses the victim grows continually weaker, and a desire for sleep comes upon him, increasing until he can with difficulty be aroused. There are tremblings of the hand and tongue which, toward the last, develop into convulsions. Every patient sleeps himself to death, for there is no cure. Careful nursing has been known to postpone the later symptoms. The duration of the disease varies with individuals; a victim may live for several years.

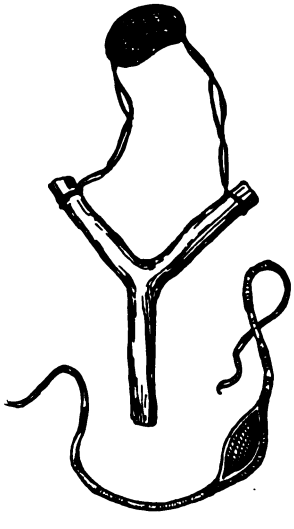
SLEEP WALKING. See SOMNAMBULISM.

SLIDELL, *sli del',* JOHN (1793-1871). See MASON AND SLIDELL.

SLIME MOLDS, minute plants of very simple structure which are found upon decaying wood and sometimes on soil containing a large proportion of humus. These molds are of spe-

cial interest because of their resemblance to minute animals. In fact, they have been described as belonging both to the animal and to the vegetable kingdoms. The spores germinate in moist soils and in humus, forming a simple cell with a single, slender, hairlike attachment, by means of which they move about. Later they lose the projection, and the cells unite in a common mass which has the appearance of mold. The cells take a variety of forms in the process of development. The masses are frequently found on stumps and bark. The largest of them may be several inches square, but they are usually much smaller.

SLING, a weapon of very ancient origin, for throwing stones or other missiles. It is probably the most ancient of all weapons for increasing the force of projectiles. In its simplest form it consists of a leather or hide strap, to each end of which is fastened a string. The stone to be thrown is placed on the strap, and the operator holds the two cords in his hand. Whirling the sling rapidly round his head to attain velocity, he releases one end, and the stone or other missile is discharged with the initial velocity at which the sling is whirled at the moment of release. This simple form is the oldest form of sling known, it having come down the centuries practically unchanged.



TWO KINDS OF SLINGS

There are many allusions to slings in the Bible, the most familiar reference being to the slaying of Goliath by David with a stone (*I Samuel* XVII, 49). It is also recorded that 250 slingers of the Benjamites "could sling stones at an hair breadth and not miss" (*Judges* XX, 16).

The ancient inhabitants of the Balearic Islands were famed for skill with the sling, and its use was of great value to the armies of Egypt, Greece and Rome. In the Middle Ages slings attached to a staff were used to hurl big stones against fortifications and castles. This sling was hurled with both hands and the size of the stone was limited only by the strength and skill of the slinger. In the ordinary one-hand sling the stone was "the size of a man's fist."

Sling Shot. In America a small hand catapult (which see) is called a *sling shot,* or *sling,* and is made by fastening elastic bands on the two ends of a forked stick. At the other ends of the elastics is a leather pouch in which is stone or small bullet is placed. The fork is held in one hand and with the other hand the elastic is stretched, the thumb and first finger holding the missile in place. Suddenly released, the elastic is projected with great force. In most cities the use of slings is forbidden. Partridges, small birds, rabbits and squirrels are easy prey to an expert in the use of this simple catapult.

Bola. This is a kind of sling used in many South American countries. It consists of three to six small stones or bullets securely fastened to the ends of an equal number of strings about two and a half feet long. The ends without weights are tied together. The slinger holds the tied end and whirls the bullets round his head. When let go into the air the bullets separate and frequently succeed in entangling legs of animals or wings of birds at which they are thrown. In some South American countries the bola consists of only one rope about six feet long with a weight at each end. F.ST.A.

SLIPPERWORT, *slip'er wurt,* sometimes called *pocket flower,* is a low, shrubby, evergreen plant whose blossoms have something the shape of a pouch or slipper. The flowers are abundant and showy, ranging in color from creamy-white to yellow, maroon or crimson, often spotted with darker shades, and are seldom marked alike on two different plants. The foliage leaves are large, close-growing and feltlike. Twelve inches is the usual height of the dwarfed variety of slipperwort, the taller species often reaching eighteen inches. All species are natives of South America, but several are cultivated in hothouses and gardens in America.

SLOE, *slo,* a spiny, branching shrub, related to the plum and found in Europe, Central Asia and on the mountains in the southern and eastern parts of the United States and Southeastern Canada. It has pure-white blossoms, which appear before the leaves and later give place to small, black fruit, about the size of a pea. The latter are used for making wine,

jelly, preserves and dyes. Canes and tool handles are made from the hardy branches of the shrub.

SLOTH, *slawth,* a group of animals belonging to the order of Edentata (which see), which includes mammals lacking in teeth or with only rudimentary ones. The sloths, as may be seen by the accompanying picture, have a most pe-

THE SLOTH

culiar method of locomotion. They move along the branches of trees upside down, and in this fashion they also sleep. In fact, they rarely come down to the ground, nor do they need to, for they feed on leaves, buds and young shoots. As they sleep by day and always move with great caution, the name sloth has been applied from the mistaken idea that they are lazy and sluggish. As a matter of fact they show considerable agility in all of their movements.

These queer animals are almost grotesque in appearance, with their tailless bodies, earless heads and blunt noses. The coarse hair is of a grayish color, which renders them inconspicuous. A sloth asleep looks very much like the stump of a bough, especially when, as is often the case, a peculiar growth of green alga is found on the hair. There are two subfamilies, one containing sloths with two toes on the front feet, and the other including those with three toes on these feet. All are natives of tropical America.

SLOT MACHINES, devices of various kinds, some used for legitimate purposes of trade and others designed solely for gambling. All work on the principle that a coin of certain named value must be deposited in a slot, and this sets the mechanism in motion. Those which serve a legitimate purpose release gum, candy, peanuts, postage stamps, cigars and other small articles, and thus a customer automatically serves himself. Automatic restaurants on this principle came into vogue in 1916. Another type of slot machine automatically delivers a specified amount of gas, according to value of the coin deposited, to the pipes and burners to which the machine is attached. There is yet another variety, which operated to show a series of stereopticon pictures, but since the advent of moving pictures it has lost its vogue. A variation of this form included a phonograph which produced songs when a coin started the mechanism. The "nickel telephone," in which a five-cent piece automatically sounds a warning to the operator, is possibly the most useful development of the slot machine for business purposes. The greater number of city telephones are of this type.

Other slot machines are gambling devices, the most common of which consists of a wheel which is set in motion by the dropping of a coin. The gambler endeavors to win money by selecting one of the many symbols on the wheel; he wins if the pointer, after spinning, stops above the selected symbol. The gambling devices are many and various; in most states and provinces they have been condemned as unlawful, but owing to lack of unity of action they are still extensively used. The pleasure boats that sail the Great Lakes and from ocean ports for cruises along the shore, although fitted with gambling devices, are compelled by state law to allow no gambling within three miles from shore, where local authority ends and national jurisdiction begins. F.ST.A.

SLO'VAKS, a Slav people living in the northern part of Hungary and in scattered settlements in adjoining districts. They probably occupied this territory as early as the fifth or sixth century A. D. They are for the most part peasant people who cultivate their farms in the most primitive manner. Many of them also wander about as laborers or tinkers. Because of oppression by the Magyars (which see), who treat the Slovaks as inferiors, large numbers of them have migrated to America. They are lovers of music, and their songs are popular among other peoples. Before the War of the Nations there were about 2,500,000 Slovaks in Europe.

SLOYD, *sloid,* a system of handwork originating in Sweden in 1872 and introduced into the United States soon afterwards, where it is taught as manual training (which see). The word *sloyd* is the English form of the Swedish word *slog,* meaning *skill of hand.*

SLUG, the name of a group of animals belonging to the Mollusca branch (see MOLLUSKS) and resembling the snails in structure and habits. They are slimy-looking creatures, lacking the external shell of the snails, but, like them,

GIANT YELLOW SLUG
About natural size.

having their eyes borne on tentacles. There are two pairs of these stalks, the eyes being on the tips of the larger ones. While the slug is slowly crawling along it secretes a slimy substance that makes locomotion easier. In the vicinity of New York and Boston there is found a garden slug that feeds especially on greenhouse plants. This is the *great gray slug,* native to Europe and introduced from there into the United States. These slugs are inclined to seek heaps of refuse and decaying matter, and they can be held in check if such accumulations are kept out of gardens and hothouses. Another species is the *giant yellow slug* of California. Some florists sprinkle ashes and cinders about plants they wish to protect, as the slug that crawls over these rough, dry objects has to secrete so much mucus that it dies of exhaustion and suffocation. See SNAIL.

SMALL ARMS, a term which embraces firearms held and fired by hand, as distinguished from artillery and machine guns. Gunpowder soon after its invention was applied to use in cannon, and later to hand arms, the first patterns of which, however, were so heavy that two men were required to carry, load and fire a gun. It was slow in firing and pattern after pattern has given place to improvements, until the modern, easily-carried and effective weapons have been evolved.

On the arrival of the early colonists in America they were, of course, provided with weapons of European make. Germany, Switzerland and France had made considerable progress in the production of firearms, and imported weapons were used in America for many years. Until the period of the Revolutionary War, in fact, weapons of old style were still in use, for the training of the early colonists had taught them to condemn the use of firearms except to obtain food or for purposes of self-defense, and they had remained satisfied with their primitive weapons.

The first rifles produced in America were cumbersome weapons of German pattern, with deeply rifled barrels, which were so hard to load that the bullet had to be driven in with a mallet. They were far more accurate in shooting, however, than those previously in use. The total weight of these rifles was about ten pounds, and the barrel measured forty to forty-five inches. In the western sections a rifle specially adapted to buffalo hunting was used, the barrel measuring thirty-four inches, firing ninety grains of powder and having a bore of over one-half inch. The rifle most suited to early use in the United States was found to be one of small bore, especially for shooting squirrels, turkeys and small game of that section. The bullets used were small, about seventy or eighty weighing a pound.

During the War of Secession about 7,000,000 rifles of different kinds were used by the contending armies, some imported, some made in arsenals already established in America. The first breech-loading rifle to be made by the government was the Hall rifle issued in 1818, though muzzle-loading muskets were used till some years later. After the War of Secession muzzle-loaders were transformed into breech-loaders. The introduction of center-fire cartridges, a great improvement on the old powder-and-ball charge, led to a great advance in the production of firearms. The breech-loaders, converted on plans suggested by a mechanic at the Springfield (Mass.) armory, fired a cartridge of .58 caliber, a brass shell containing seventy grains of powder and 450 grains of lead. The caliber of the rifle named the Springfield was reduced in 1873 to .45, with seventy grains of powder and 405 grains of lead.

The introduction of smokeless powder led to still further improvements. The advantages of the new explosive were obvious. Vast quantities of smokeless ammunition were made during the Spanish-American War for use in the Springfield rifle of .45 caliber. The caliber was further reduced when the Krag-Jorgensen rifle was adopted in 1892, with .30 caliber. The Springfield rifle of later pattern (1900) also has a caliber of .30, is fitted with a magazine, and in the hands of an expert is capable of firing twenty shots in 28¾ seconds.

Rifles for hunting purposes have kept pace with the improvements effected in military weapons. Smokeless powder at once found universal favor among hunters, and a jacketed bullet, that is, a bullet with a lead core, has been found the most effective. On striking game this bullet expands and inflicts a terrible wound. The Winchester repeating rifle with a .405 caliber, used by sportsmen throughout the world, fires a cartridge containing a 300-grain bullet with a charge developing a muzzle velocity of 2,204 feet per second. Shooting with the many different makes of revolvers has also greatly improved since the general use of smokeless powder, which does not readily foul the barrel. During recent years the revolver has been partially superseded by automatic pistols, of which there are many patterns using smokeless powder and steel-covered bullets. Numerous small-bore rifles are popular, the .22 caliber repeater being an excellent weapon for hunting small game. F.ST.A.

Related Subjects. The reader is referred to the following articles in these volumes:

Blunderbuss	Revolver
Bullet	Rifle
Cartridge	Shotgun
Musket	Smokeless Powder

SMALL'POX, one of the most contagious diseases known. Formerly epidemics of smallpox carried off thousands of victims, but its ravages are now checked by vaccination, which is an almost certain preventive of the disease in severe form (see VACCINATION). Unlike many diseases, smallpox spares none, for tiny babies and aged persons are alike susceptible to it. The typical symptom is an eruption of the skin that sometimes leaves the victim with permanent scars, called pockmarks.

About twelve days after exposure the patient feels the first symptoms—severe chill, pains in the back, limbs and head, and nausea, with temperature rising to 103° F. or higher. On the third day small, red pimples, which feel like bits of shot, appear on the face, spreading rapidly to the other parts of the body. In some cases a preliminary rash appears on the second day, but it fades away before the true eruption breaks out. On about the sixth day the pimples fill with matter, and a depression appears on the center of each. In the interval between the first rise in temperature and the formation of pus the temperature falls practically to normal, but there is a high fever from the time the ulcers appear until the rash dries up. This period lasts about a week and is marked by headache and sleeplessness and in some instances by delirium.

Treatment is directed chiefly toward keeping down the temperature, relieving pain, and preventing infection of the eyes and disfigurement of the face. Permanent scars, however, cannot be prevented if the ulcers reach the true skin. Various methods are employed to avoid pitting, such as keeping the face covered with lint soaked in an antiseptic preparation, and protecting it from the light. No specific drug is known which has definite curative effects, but the disease is kept in check in all civilized countries by means of vaccination and sanitary measures. C.B.B.

SMELL, the special sense which enables one to distinguish odors. The sensation of smell results when the *olfactory lobes* of the brain are stimulated, but one always thinks of the nose rather than the brain in this connection (see NOSE). Both are essential, for the brain contains the smell center, while the nose contains the cells in which the nerves of smell terminate. These olfactory cells are distributed through the mucous membrane in the upper part of the nasal cavities. They end on the surface in tufts of hairlike processes that are stimulated by odorous gases drawn up through the nostrils. The nerves leading from the cells transmit the impulse to the brain center, and it is there registered as an odor. Only those substances which are in the form of a vapor or a gas can give off odor. When we sample a fragrant toilet water we really smell the vapor arising from it. Air must pass through the nostrils before an odor can be perceived, so a person in smelling a substance "sniffs" to draw air into the upper part of the nose.

The sense of smell is diminished when one has a cold, because the nerve endings are covered with too much mucus. The victim of a cold often complains that he cannot taste anything or that all foods taste the same. This is because taste and smell are very closely related. In fact, the enjoyment of many foods comes from the fact that they stimulate the sense of smell. While the sense of smell is very delicate, it is not of long duration. Most people can detect the odor of camphor when it is diluted in the proportion of 1 to 400,000, and one drop of strong perfume will scent the air of an entire room. At the same time, persons remaining in the room would soon cease to be aware of the odor, though it would be perceptible to one on entering. The sense of smell

enables one to detect spoiled food and bad air, and in this it serves a very useful purpose. Many of the lower animals have a much keener sense of smell than human beings, and it is this faculty that makes dogs of such value in tracking game. C.B.B.

SMELL'ING SALTS, ammonium carbonate drenched in perfume for use as a restorative, for headaches and to relieve nasal catarrh. It is only the pungent fumes of ammonia that are effective. Some of the perfumes used are oils of lavender, lemon, cloves, bergamot and pimento. These preparations are often put up in very ornamental bottles.

SMELT, a genus of fish, closely related to the salmon and prized as food because of the delicate flesh. The common American smelt occurs along the Atlantic coast from the Gulf of Saint Lawrence to Virginia, and is found in various northern lakes. In the winter it enters streams for the purpose of spawning, and then is caught in large numbers through holes in the ice. Smelt are often marketed after being frozen, but the unfrozen, or "green," fish are considered the greater delicacy. The body is a transparent greenish above and silvery on the sides; the average length is eight or ten inches. Large specimens are over a foot long and weigh about a pound. A similar species is found on the Pacific coast, from San Francisco north to Bristol Bay, Alaska. The annual catch in the United States, amounting to about 4,000,000 pounds, is valued at $175,000. About 10,000,000 pounds, worth $900,000, are caught in Canada.

SMET, Peter John de (1801-1872), a Jesuit missionary to the Indians of the Mississippi Valley, was born at Termonde, in Belgium, and educated at Mechlin. He sailed to the United States in 1821, taught in an Indian school at Florisant, Mo., and later in the newly-established University of Saint Louis, and in 1838, having been ordained a priest, began his work among the Indians. Many of the tribes in the great valleys of the Missouri, Yellowstone and Platte rivers knew him and felt his influence—the Potawatomi, Flatheads, Sioux, Blackfeet and Pend d'Oreilles; for he traveled scores of thousands of miles among them, on foot, on horseback or by canoe. Several times he visited Europe, where he raised large sums to promote his work, and induced other missionaries to join him. His published works include *Letters and Sketches of a Residence in the Rocky Mountains,* also *Western Missions and Missionaries* and *New Indian Sketches.*

SMETANA, *sma tah'na,* Friedrich (1824-1884), a pianist and composer, was born at Leitomischl, Bohemia. He began the study of music at so early an age that he could not remember the time, and had progressed so far that when six years old he was giving public concerts. He studied at Prague and at Leipzig, where he became intimate with Schumann and Mendelssohn. When scarcely twenty-one he was made concert-master by Emperor Ferdinand of Bohemia, and during the next twelve years was busy not only with this work, but also with the directing of a music school founded by him at Prague. For some years he was conductor of the Philharmonic Society of Gothenburg, Sweden, but in 1866 returned to Prague, where the remainder of his life was spent. In 1874 he lost his hearing; this misfortune so preyed upon his mind that on his sixtieth birthday he lost his reason and spent his last days in an asylum. Among his best works are the operas, *Braut* and *Dalibor,* and the well-known string quartette, *From My Life.*

SMILAX, *smi'laks,* a group of useful, vine-like plants of the lily family, containing about 200 species, growing in temperate and tropical regions. The graceful hothouse plant of this name, so largely used for decorative purposes,

SMILAX

is a native of the Cape of Good Hope, and is not a true smilax. Familiar American species are the carrion flower and the greenbrier. Almost all of the species of true smilax are woody vines, with hardy, tuberous roots, evergreen leaves veined from tip to base, and stems which end in tendrils by which the plant climbs. Several tropical varieties furnish sarsaparilla, and from the leaves of others a sweet tea is made. The pliant stems of certain kinds are worked into baskets, and in some of the Southern states they make beer from smilax roots and also fatten hogs on them.

SMILES, Samuel (1812-1904), a Scottish writer, born at Haddington. Prepared at Edinburgh for the medical profession, he practiced

at Haddington and at Leeds, where he later became editor of the *Times*. During a considerable period of his life he held railway secretaryships. His writings deal with a variety of subjects, but those which have been most read are didactic works, with a strong moral purpose. Among these are *Self Help, Character, Thrift* and *Duty*. His other writings include *Lives of the Engineers; Industrial Biography;* and *The Huguenots, Their Settlements, Churches and Industries in England and Ireland.*

SMITH, ADAM (1723-1790), a British economist and founder of the science known as *political economy,* or *economics,* was born at Kirkcaldy, Scotland. He was educated in the University of Glasgow and Oxford University and in his twenty-fifth year went to Edinburgh. There he gained considerable notice as a lecturer on literature and philosophy. In 1751 he was appointed professor of logic and ethics in the University of Glasgow and in that position spent twelve happy years. At the end of that period he resigned to become the traveling companion and teacher of the Duke of Buccleuch, and remained abroad for the next three years. After 1776 he spent most of his time at Kirkcaldy in the study of economic and sociological subjects.

His famous and truly great book, *The Wealth of Nations,* appeared in 1776, and is considered the first systematic treatise on political economy. All subsequent study of the subject has followed the general plan and principles set forth in this work. In 1787 Smith was elected Lord Rector of the University of Glasgow, an honor which he declared made him "supremely happy." He died at Edinburgh on July 17, 1790.

The Wealth of Nations set an admirable example for economic students by its keen observation of actual facts and its drawing of general principles from these instead of from preconceived theories. In the opinion of present-day economists the book is frequently in error, but its value as a guide and inspiration to investigators and students of economic conditions can hardly be overestimated.

SMITH, EDMUND KIRBY (1824-1893), an American soldier, one of the most fearless Confederate officers in the War of Secession. He was born at Saint Augustine, Fla., was graduated at West Point in 1845, and served with distinction in the Mexican War, being twice brevetted for gallantry, at Cerro Gordo and at Contreras. From 1849 to 1852 he taught mathematics at West Point, and in 1855 was appointed captain of cavalry. On the secession of Florida he resigned his commission in the United States army, and in 1861 became a brigadier-general in the Confederate service. He served under Joseph E. Johnston and led the advance of Bragg's army in the Kentucky campaign. In 1863 Smith was given command of the Confederate forces west of the Mississippi, and in 1864 he defeated General Banks in the latter's Red River expedition. His forces were the last to surrender at the close of the war (May, 1865). General Smith became interested in commercial enterprises after the war, and from 1866 to 1868 was president of the Atlantic and Pacific Telegraph Company. In 1870 he was appointed chancellor of the University of Nashville, remaining there until 1875. From 1875 until he died he was professor of mathematics in the University of the South at Suwanee, Tenn.

SMITH, FRANCIS HOPKINSON (1838-1915), a versatile American author, architect, artist and engineer, was born at Baltimore. He was educated for civil engineering and attained success as a designer and builder of lighthouses, sea walls and other large masonry works. He built the foundation for the Statue of Liberty, in New York harbor. His avocations, painting and literature, have made him more famous than his vocations. He has been awarded numerous medals for landscapes in water colors and charcoal drawings; as a writer he shows his training as an artist, for his descriptions are delightful in their sureness and delicacy of touch, while the atmosphere created in each story is not unlike that which hovers about a picture of merit.

F. HOPKINSON SMITH

In *Colonel Carter of Cartersville* he probably reached his greatest literary success, but *A Gentleman Vagabond, Caleb West, The Under Dog, Colonel Carter's Christmas, Tom Grogan* and others have an almost equal charm in characterization, quaint humor and local color. These stories possess much dramatic character; *Colonel Carter of Cartersville* was put into the form of a play, with very few changes, by

Augustus Thomas, and was highly popular. Smith's ability to observe and describe minute details adds to the vividness of his sketches and stories and gives them an air of probability that is delightful.

SMITH, GOLDWIN (1823-1910), a man of letters whose writings on history and on the affairs of the day spread his fame wherever English is spoken. He was born at Reading, in Berkshire, England, was educated at Eton and at Magdalen College, Oxford, and in 1847 was called to the bar. He made no attempt to practice law, but during and after his years as professor of modern history at Oxford (1858-1866) devoted much attention to journalism. In 1864 he delivered a series of lectures in the United States, and in 1868 removed to that country and accepted a position as professor of English and constitutional history at the newly-organized Cornell University, Ithaca, N. Y. Three years later he resigned his professorship, and after that time made his home in Toronto, Ontario, and is therefore considered a Canadian.

GOLDWIN SMITH

Smith contributed to the chief English and American papers, and in Toronto founded *The Canadian Monthly, The Nation* and *The Week.* Everything that came from his pen commanded an interested audience, not only because of the sound knowledge on which it was based, but also because of his unusual skill in the use of language. His historical writings, which include *Irish History and Irish Character, A Short History of England down to the Reformation,* and *Irish History and the Irish Question,* are marked with extraordinary vividness, and show, moreoyer, sound historical judgment, though they often roused the opposition of politicians. He stirred up much antagonism, also, by strenuously advocating the union of Canada with the United States, not only commercially, but politically.

His writings were very numerous; in addition to those noted above, the following may be mentioned: *My Memory of Gladstone, In Quest of Light, Guesses at the Riddle of Existence, The Founder of Christendom* and *Labor and Capital.* What he wrote in connection with the industrial situation as he viewed it was the reflection of personal work he undertook to bring about more cordial relations between the various elements of society. A.MC C.

SMITH, HOKE (1855-), American journalist and political leader, born in North Carolina and educated in a private school conducted by his father. In 1872 he removed to Georgia. In the next year, even though only eighteen years old, he was admitted to the bar. He became a leader in his profession and also found time to make the *Atlanta Journal,* which he owned from 1887 to 1898, one of the leading newspapers of the South. His first activity in politics was as delegate to the Democratic state convention of 1882; he was Secretary of the Interior from 1893 to 1896, in Cleveland's Cabinet, and was governor of Georgia from 1907 to 1909. He was reëlected governor in 1911, but resigned after a few months to become United States Senator. He was reëlected in 1914 for the term ending March 4, 1921.

SMITH, JOHN (1580-1631), a famous leader of the English settlers of Virginia in 1607, was born at Willoughby, Lincolnshire, England. His adventures as told by himself are marvelous, and cannot be credited entirely. As a soldier of fortune serving in the Protestant wars against the Saracens he states that he killed three gigantic Turks in single combat in Transylvania, and thereby received his coat-of-arms, emblazoned with three Turks' heads. Taken prisoner in the Battle of Rothenthurm, he claims to have been sold as a slave and given to a Turkish lady, who fell in love with him, but desiring freedom above all else, he killed his overseer and made his escape, eventually reaching England.

It is a matter of record that in 1606 he sailed as an ordinary colonist in the expedition to Virginia, but showed such ability that soon after the settlement of Jamestown he became executive head and ruled so firmly that order quickly succeeded confusion. Captured by Powhatan in December, 1607, he declared he was saved by the Indian girl, Pocahontas, who threw her body on his when the executioner's ax was about to fall. He was so badly wounded by an explosion of gunpowder in 1609 that he was compelled to return to England. In 1614 and 1615 he explored the New England coast, made fairly accurate maps and wrote interesting descriptions of what he saw, and for this service received the title "Admiral of New England."

"A restless, vain, ambitious, overbearing, blustering fellow, who made all men either his hot friends or his hot enemies," one biographer says of him; he nevertheless belonged to the sane and wholesome class of men that can plan and can do. His *True Relation of Virginia, Description of New England* and *The Summer Isles* are vigorously written and possess true

CAPTAIN JOHN SMITH
From an old painting.

historical and geographical value. Smith was a man of great energy and versatility, and will always hold a high place as one of the founders of American civilization. E.D.F.

Consult Bradley's *Captain John Smith;* Jenks' *Captain John Smith.*

Related Subjects. The following articles in these volumes will explain the references in the above discussion of John Smith, and will give further information:

Jamestown	Saracens
Pocahontas	Virginia, subhead
Powhatan	*History*

SMITH, Joseph (1805-1844), the founder of the Church of Jesus Christ of Latter Day Saints, more commonly known as the Mormons, was born at Sharon, Vt. Early in life he showed those hereditary tendencies that had so large a part in shaping his career, for both his parents and grandparents were believers in heavenly visions and miraculous cures. The Smith family moved to Manchester, near Palmyra, N. Y., in 1819, and the boy began work as a farm laborer. In 1820, during a season of religious revival, he received, according to his own account, a vision directing him not to join any existing religious sect, but to await spiritual guidance as to his future. This was the first of the series of visions which were the inspiration of the *Book of Mormon* and out of which developed the great Church now centered at Salt Lake City, Utah.

JOSEPH SMITH
The founder of the Mormon Church.

In these visions he was told where he would find buried a number of gold plates, upon which were inscribed "the fullness of the everlasting gospel." He was told, as he himself said, to dig in a mound four miles from Palmyra, and there he claimed to have found the plates. These he translated from the "reformed Egyptian," in which he said they were written. He did this work shielded behind a thick curtain. The information they contained, which is embodied in the *Book of Mormon,* he made the foundation of his new Church. This sect, which he named the Church of Jesus Christ of Latter Day Saints, or the Mormon Church, was organized in 1830 at Fayette, N. Y. Smith claimed to have received the priesthood of Aaron from John the Baptist, and the priesthood of Melchizedek from Peter, James and John. His followers quickly recognized him as a prophet, and, as the religious unrest of the times was favorable to the founding of a new sect, he soon was the leader of a very considerable number of Mormon believers.

Shortly after the organization of the Church at Fayette, Smith sent out a number of missionaries. Among their first converts was Sidney Rigdon, then pastor of a church of the Disciples of Christ in Mentor, Ohio. Rigdon at once became a Mormon leader, and in 1831 accompanied Smith to Kirtland, Ohio, where

he gave valuable assistance to his leader in establishing the new sect. There a general store, a steam sawmill and a tannery were soon being operated by them; land was bought and a great city platted, and in 1836 they consecrated a stone temple. Another of the early converts was Brigham Young, who joined Smith at Kirtland in 1832, and whose qualities of leadership, persuasive eloquence and practical sense were destined to exert a powerful influence on the history of the Church.

Difficulties beset the community at Kirtland from the beginning. There were persecutions from without and dissensions within the body, and an attempt to depose Smith was thwarted only by the determined opposition of Young and Rigdon. Nevertheless, before the settlement broke up, most of the details of the Church organization were worked out. During the years at Kirtland, Smith, with untiring zeal, was sending out missionaries and attempting to spread his doctrines in the states farther west. Mormon emigration to Missouri had begun as early as 1830, and in 1838, when the settlers in Kirtland were driven out, Smith and Rigdon fled to a new settlement called Far West (now Kerr), in Caldwell County, Mo. There the Mormons were in conflict with the native Missourians from the beginning, and Far West soon surrendered to a force of state militia.

The scene of Smith's activities was then removed to Nauvoo, Ill., where a numerous body of his followers was already encamped. In December, 1840, the state legislature granted them a charter giving Smith nearly unlimited civil authority. The city grew rapidly, a university was established, and in 1841 the foundation of their new temple was laid. Yet the fair outlook in the new and beautiful settlement was not destined to fulfil its promise. Smith aroused enmity here, as elsewhere, because of his clashes with civil authority. Furthermore, it became rumored that he had a revelation establishing and approving polygamy, which aroused indignation throughout the community. A newspaper was established to oppose him, the editors of which were driven out of the city. In 1844 there was a general uprising against the Mormons, and Smith put Nauvoo under martial law.

At this critical period his most efficient lieutenant, Brigham Young, was away on a gospel mission to the Eastern states, and the Mormon leader found the tide too strong for him. Arrested on the charge of treason, Joseph and Hyrum Smith (a brother) and others were placed in the jail at Carthage on June 25. On the night of the 27th a mob, aided by the militia guard, broke into the prison and shot the two brothers. M.M.B.

Related Subjects. In connection with this study of Joseph Smith, the reader will find the following articles of interest:

Latter Day Saints	Salt Lake City
Mormons	Utah
Polygamy	Young, Brigham

SMITH, SAMUEL FRANCIS (1809-1895), an American poet and clergyman, born at Boston. He graduated from Harvard in 1829 in the same class with Oliver Wendell Holmes and James Freeman Clarke, and pursued further study in Andover Theological Seminary. He was ordained in the Baptist ministry in 1834, and in that year became pastor of a church at Waterville, Me., and professor of modern languages in Waterville College. He was a pastor at Newton, Mass., from 1842 to 1854, at the same time edited *The Christian Review,* published at Boston, and took an active part in preparing the publications of the American Baptist Missionary Union. At length he devoted most of his time to the work of this Union, and made two trips around the world investigating its numerous stations.

His fame rests upon his authorship of *America,* first sung in Park Street Church, Boston, July 4, 1832; but he wrote a large number of other well-known hymns, among them *The Morning Light is Breaking.* He was author of several books on missionary topics, such as *Missionary Sketches* and *Rambles in Mission Fields,* but is remembered to-day almost solely for the poem which is popularly, but not legally, the national anthem of the United States. For the details of the origin of *America,* see the article under that title.

SMITH, SYDNEY (1771-1845), an English clergyman and humorist, born at Woodford, Essex. He graduated from New College, Oxford, where he was later given a fellowship, and in 1794 he became curate of Nether Avon, on the Salisbury Plain. Four years later he removed to Edinburgh, where he engaged in preaching and tutoring, and where he aided Brougham, Jeffrey and other men of eminence to establish the Edinburgh *Review.* To this periodical he continued to contribute for twenty-five years. In 1804 he began in London a series of lectures on moral philosophy which were brought to an end in 1806 when he became rector of Foston-le-Clay in Yorkshire. After twenty-two years of service here he was

presented with the more desirable rectory of Combe-Florey, and from 1831 until his death he was connected with Saint Paul's, London.

Notable among his writings are the *Letters on the Subject of the Catholics,* which helped to secure Roman Catholic emancipation. Smith's humor is powerful, yet always good-natured. The following quotations will give some slight idea of his manner and the whimsical quality of his humor:

Looked as if she had walked straight out of the Ark.

My living in Yorkshire was so far out of the way, that it was actually twelve miles from a lemon.

It is not more than a week ago that I heard him speak disrespectfully of the equator.

SMITH COLLEGE, a prominent college for women, founded at Northampton, Mass., by Miss Sophia Smith. It received a charter in 1871, and class sessions began in 1875. The annual student enrolment at the present time is over 1,800, and the faculty numbers about 165. Smith College gives the usual courses leading to the degree of Bachelor of Arts, and confers also on postgraduate students the degree of Master of Arts. Among the college buildings are the library, with 60,000 volumes, an observatory, a plant house with well-equipped botanical collections, an art gallery and a hall containing an auditorium seating 2,300. The college aids in the support of science work at Naples, and contributes to the support of the classical schools at Rome and at Athens. The buildings and grounds are valued at nearly $2,000,000.

SMITHS FALLS, a town in Lanark County, Ontario. It is situated on the Rideau Canal, on the Canadian Northern Railway and on two lines of the Canadian Pacific Railway. By rail it is twenty-eight miles northwest of Brockville, forty-two miles southwest of Ottawa, 128 miles west of Montreal and 212 miles east of Toronto. It is a flourishing manufacturing center, especially noteworthy among its products being agricultural implements, stoves, woolen goods and flour. Smiths Falls has a collegiate institute. Population in 1911, 6,370; in 1916, estimated, 6,600.

SMITHSO'NIAN INSTITU'TION, an institution established at Washington, D. C., in 1846 for the "increase and diffusion of knowledge among men," as stated by its founder. It owes its existence to the generous bequest of an Englishman, James Smithson, who left over $515,000 to the United States government for the purpose.

Congress accepted the legacy and established the Institution by an act approved August 16, 1846. The first secretary, Joseph Henry, outlined a broad and general policy of administration, to which later secretaries have adhered (see HENRY, JOSEPH). The Institution has justified the intentions of its founder by encouraging original research in science and literature; by publishing the results of such research, and by promoting a freer interchange of ideas among leading men of science and scholars throughout the world. Subsequent gifts and appropriations of public money have increased the scope of its activity. In addition to a Bureau of Exchange, which facilitates intercourse among students in all countries, the Institution comprises a Bureau of American Ethnology, the National Museum (see NATIONAL MUSEUM OF THE UNITED STATES), the Astrophysical Observatory, the Langley Aërodynamical Laboratory and the National Zoölogical Park.

SMITHSONIAN INSTITUTION
Founded by a subject of Great Britain who never set foot on American soil.

The Institution is legally an establishment having as its members the President of the United States, the Vice-President, the members of the Cabinet, and the Chief Justice; it is governed by a board of regents composed of the Vice-President, the Chief Justice, three members of the Senate, three members of the House of Representatives and six citizens selected by Congress. The Secretary, who is chosen by the regents, is the executive officer.

James Smithson (1765-1829), who founded the Institution, was the son of Hugh Smithson, first Duke of Northumberland. He was educated at Oxford, specializing in chemistry and mineralogy, and later achieved considerable distinction and received election as a vice-president of the Royal Society. In regard to his gift to the United States he wrote: "My name shall live in the memory of man when

the titles of the Northumberlands and the Percies are extinct and forgotten." G.B.D.

Consult Rhees' *The Smithsonian Institution: Documents Relative to Its Origin and History.*

SMOKE, the visible vapor that arises from a burning substance, especially wood, coal, peat or petroleum. Smoke contains water vapor, carbon dioxide or some other gases, but the visible portion consists of minute particles of unburned carbon that form the soot. When combustion is perfect the smoke is nearly invisible. A great volume of black smoke indicates imperfect combustion and a consequent waste of fuel. Soft coal and crude petroleum produce the largest quantities of soot of any fuels, and in large cities where soft coal is the principal fuel the smoke becomes a nuisance. A scientific investigation of the air about Chicago in 1915 showed that the chimneys of that city threw out 179,511 tons of solid matter in a year. By far the greater part of this matter was soot. Several American cities are making systematic efforts to control the smoke evil, a greater part of which is caused by careless stoking and imperfect draft. Automatic stokers, which feed the fire no faster than fuel is consumed, and properly constructed chimneys and flues are among the best means for preventing smoke. City authorities are now insisting upon these devices. See Soot.

SMOKE'LESS POW'DER, a powerful explosive made by combining some form of cellulose with a mixture of sulphuric and nitric acids and then with acetic acid or acetone. The smokeless powder most extensively used is prepared by kneading guncotton (which see) into a paste with acetic acid. It exerts about twice the force of ordinary gunpowder. The powder is smokeless because the products of the explosion are all gaseous, whereas those of gunpowder are fully fifty per cent solid matter.

While the most extensive use of smokeless powder is in the big guns of the artillery and navy, where it has wholly displaced gunpowder, it is also used in smaller firearms, and for blasting under certain conditions. Various grades are manufactured, each being adapted to its purpose. When strong acid is used in its preparation, an explosive of great strength is produced, and a powder of any desired strength can be made by regulating the strength of the acid used in its manufacture.

The history of smokeless powder begins with the discovery of mercuric fulminate in 1800, and of guncotton in 1845. In 1875 the Swedish engineer, Alfred Nobel, made the first preparation, now known as *ballistite.* This is used by the Italian navy. Other preparations in common use are *cordite,* used by the British, *indurite,* used by the United States, and *B. N.,* used by the French.

Related Subjects. For a more extended view of this subject the reader is referred to the following articles in these volumes:

Acetic Acid	Explosives
Ammunition	Guncotton
Cellulose	Gunpowder
Cordite	

SMOLLETT, *smol'et,* TOBIAS GEORGE (1721-1771), a British novelist born near Dumbarton, Scotland. After receiving a grammar school education he was sent to the University of Glasgow to study medicine and was later apprenticed to a surgeon of Glasgow. However, he was more interested in the profession of literature than in that of surgery, and by 1739 had produced a tragedy, *The Regicide.* Having tried unsuccessfully in London to secure the acceptance of this play, he embarked as surgeon's mate on the *Cumberland,* which was about to join Admiral Vernon's expedition against Cartagena (1740). After his return to London he left the navy and again attempted literary production. In 1748 appeared the first of his noted works, the novel *Roderick Random,* which is a story based largely upon his experiences at sea. It became immediately popular. Of his later works the most noteworthy are *Peregrine Pickle* and *Humphrey Clinker.* These novels, as well as *Roderick Random,* depend for attractiveness upon amusing and thrilling incidents; they are not carefully constructed and the character portrayal attempted is somewhat superficial. Smollett was for a time editor of the *Critical Review* and later of the *Briton,* both of which were Tory periodicals.

SMUGGLING, *smug'ling,* the practice of taking into a country dutiable merchandise without paying the customs duties. All countries which impose customs duties have stationed at their ports of entry and at points on the borders of countries adjoining them certain officers whose duty it is to examine both personal baggage and shipments of merchandise, to see that the goods are not undervalued and that the regular duties are paid. Violators of the laws respecting customs are punished by fine, imprisonment or forfeiture of goods, according to the magnitude of the offense. The term refers also to the practice of bringing into a country an article whose importation is prohibited by law.

Related Subjects. The reader is referred to the following articles in these volumes:

Customs Duties	Port of Entry
Free Ports	Protection
Free Trade	Revenue-Cutter Service

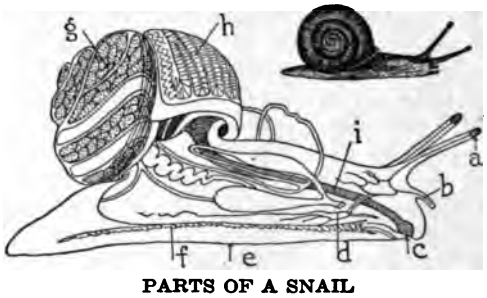
SMUTS, minute plants (fungi) which live in certain other plants as parasites. Smuts attack wheat, oats, barley and corn and cause great damage to crops every year. The black dust, or smut, consists of the millions of spores given off by the ripened fungi. These lodge on other plants, penetrate to the interior and begin their growth to produce another crop of spores. The smuts which attack wheat, oats and barley are in the seed, and in most cases the spores can be killed by treating the seed before planting. Soaking wheat in a solution of one pound of copper sulphate to a gallon of water for five or six minutes will destroy the spores of wheat smut. Oat smut is destroyed by spreading the seed on a floor and sprinkling it with a solution consisting of one pound (one pint) of formalin to fifty gallons of water. Soaking the seed in hot water is also effective. The temperatures may range from 125° to 135° F.

Corn smut does not get into the seed, so cannot be prevented by any of the methods already described. The spores lodge in the soil and in manure, and attack the young plants, penetrating the stalk and sending fibers into every branch, leaf and flower. In this way the fibers get into the ear, where the fungi mature and burst forth just as the farmer thinks he is to have an abundant crop. The smut, which is of a bluish-black color, appears at the tip of the ear, where the kernels swell to several times their normal size and burst, sending the spores into the air to be blown about by the wind. Smut may also appear in the tassel and the leaves.

Corn smut is prevented with difficulty because the spores may be carried over to the next season in so many ways. Masses of smut are left on the ground and remain in the soil. The spores get into the fodder and then into the manure, where, in the spring, spores which attack the next crop are developed. Rotation of crops is the surest preventive of corn smut, since the spores will not live in the soil over more than one season. Seed from an infected field should not be planted, and all smut-infected ears should be destroyed, if possible, before the spores mature. See FUNGI; BACTERIA AND BACTERIOLOGY. W.F.R.

SMYRNA, *smir'na,* the chief seaport of Asiatic Turkey and the capital of the vilayet of Smyrna, is situated on the western coast of Asia Minor, on an arm of the Mediterranean Sea (see map, opposite page 417). It lies about 200 miles southwest of Constantinople, with which it is connected by a line of railway, and is built partly on the slopes of Mount Pagus and partly on the plain below. This interesting city, which is on the site of a Greek colony in existence over seven centuries before Christ, is now famed chiefly as the center of an Oriental rug trade. Smyrna rugs are made in various small villages in the vicinity. The city has an excellent harbor and a modern quay, and in normal years exports great quantities of figs, raisins, sponges, silk goods, rugs, hides and grain. There are five distinct sections to the city, the Mohammedan, the Jewish, the Armenian, the Greek and the European. Fine churches, schools, hotels and shops give the European quarter the aspect of a modern city, and the Armenian and Greek sections are of a similar character. The population of the place is estimated to be 350,000; over one-half of the people are Greeks. Smyrna was bombarded by an allied fleet during the War of the Nations, but was not captured.

SNAIL, *snayl,* a group of mollusks inhabiting both land and water, and distinguished by having a spirally-coiled shell attached to the soft body (see MOLLUSKS). A snail, when it desires protection or wishes to go into winter



PARTS OF A SNAIL

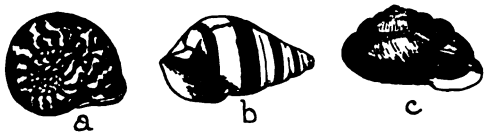
(*a*) Eye; (*b*) tentacle; (*c*) mouth; (*d*) nerve ganglia; (*e*) foot; (*f*) mucous gland; (*g*) liver; (*h*) lung; (*i*) aesophagus. The upper illustration shows the snail in its natural position.

quarters, withdraws the entire body into the shell, as the attaching membrane is a muscular process. This shell, which consists of but one valve, is often called the "house of the snail." This covering is secreted by the skin of the animal, and is composed of a limy substance. At first the shell is soft and pliable, but it becomes harder as the animal grows to maturity. Charles Lamb once wrote—

> The frugal snail, with forecast of repose,
> Carries his house with him where'er he goes.

Snails move so deliberately that the expression "slow as a snail" has become proverbial.

The typical land snails are found in warm, damp places in fields and woodlands; they especially like a situation under a fallen log or in a mossy tree stump. Their organ of locomotion is a so-called foot, a long, muscular projection extending from the shell. By contractions of this organ the snail slowly crawls along, its progress being aided by the secretion of a slimy mucus. One of these creatures can be trailed by the slimy track it leaves behind it. On the forward end of the foot is a head bearing two pairs of tentacles, or horns, and on the upper pair of tentacles are the tiny, black eyes, capable of seeing in all directions. The lower pair of horns constitute the organs of



LAND SNAIL SHELLS

(*a*) Common Philippine variety; (*b*) colored shell from Florida; (*c*) the most common shell found in America.

touch. The mouth is provided with a peculiar, ribbonlike tongue, which is covered with numerous tiny, hard teeth. Though snails are fond of leaves and other vegetable matter, some are flesh eaters. In many places in Southern Europe these animals are used as food, and in France they are fattened for the market in snaileries.

SNAKE, the general name of the largest order of the reptile group, which includes also lizards, turtles, tortoises, alligators and crocodiles. Though the majority of snakes are harmless, and many of them perform a useful service by killing and devouring insects, mice and gophers and other farm pests, most people regard the snake tribe as the most repulsive in the entire animal kingdom. This prejudice against these creatures is too deep-rooted to be argued away. It existed in early Bible times, for in the story of the Garden of Eden a serpent is taken as the symbol of the Evil One, and a curse was pronounced upon it (see *Genesis* III, 14—"Dust shalt thou eat all the days of thy life"). Eating dust is the picturesque Bible way of saying that snakes have no legs. With the exception of a few species possessing rudimentary hind legs, the serpents are entirely lacking in the ordinary means of locomotion, but crawl by special movements of the ribs and scales.

The body is regularly cylindrical and has no distinct divisions of head, trunk and tail. Contrary to the belief of many, it is not slimy, but is covered with dry scales, which are folds in the skin. There are no external ears and no eyelids. The sense of hearing is made possible by an internal auditory mechanism, and the eyes are protected by a transparent cap that is shed with the skin. Like the Evil One, of which it is the type, the snake sleeps with its eyes open. The tongue is long, slender and forked. It is the animal's best organ of touch, and is thrust out when it wishes to ascertain its whereabouts. The teeth, which curve backward, are sharp and pointed, and are used in seizing food but not for chewing, as the prey is swallowed whole. Poisonous species have, in addition to the ordinary teeth, perforated fangs through which the poison fluid passes from glands at their base. Snakes can swallow creatures much larger than themselves, as the lower and upper jaws are hinged together in such a manner that the mouth can be widely extended. In addition, the halves of the lower jaw are connected in front by an elastic band, and each side can be pushed forward independently. Sometimes the prey is swallowed alive, but the huge pythons and boas first kill their victims by crushing them.

Snakes range in size from small creatures not over five inches long to the giant anacondas of South America, which grow to be thirty or forty feet in length. There are between 1,500 and 2,000 species, found in practically all parts of the globe except in the polar regions, and occurring most abundantly in the tropics. They live on and under the ground, in fresh and salt water and in trees. Animal life constitutes their chief food, but a few species eat eggs. Some snakes lay eggs and others bring forth their young alive. A characteristic of the serpent tribe is the habit of molting the skin several times a year (see MOLTING). E.B.P.

Consult Ditmar's *Reptiles of the World.*

Related Subjects. The most important snakes are described in these volumes under the following headings, and there are illustrations with many of them:

Adder	Garter Snake
Anaconda	Glass Snake
Asp	Milk Snake
Black Snake	Moccasin Snake
Boa	Python
Cobra	Rattlesnake
Copperhead	Viper

SNAKE DANCE, a weird ceremonial dance of the Arizona Hopi Indians (see HOPI), in

which the dancers, who are members of the Antelope and the Snake priesthoods, carry live snakes in their mouths. Rattlesnakes are principally used, but the reptiles are handled so carefully the dancers are rarely bitten. After the ceremonial the entire village indulges in a feast. The snake dance is held every two years, in August, and is a plea to the powers of nature to send rain.

SNAKE INDIANS. See SHOSHONEAN INDIANS.

SNAKE RIVER, a river of the Western United States which furnishes an abundance of water power and is beginning to be used for irrigation purposes. It is the largest tributary of the Columbia River, which it joins near Pasco, Wash. Rising high in the Rocky Mountains of Yellowstone Park, the Snake flows in a southwesterly direction to the southern part of Idaho, turns westward and flows across the state nearly to the Oregon line, and then swings abruptly northward. For 170 miles it forms the boundary between Idaho and Oregon, and for about thirty miles flows between Washington and Idaho. At Lewiston it turns westward into Washington. Though the stream is over 900 miles long, its many falls and rapids render it useless for navigation except between the mouth and Lewiston, a distance of 100 miles. The Indians called the river Shoshone, and this name is given to a magnificent cataract near the Idaho-Wyoming boundary.

SNAKEROOT, the name applied to a large number of plants, because their roots resemble snakes, or for the reason that they were at one time believed to cure snake bites. They are found quite generally throughout the United States and in many parts of Canada, and their roots in many instances have medicinal value. *Black snakeroot,* or *cohosh,* yields a drug used in treating Saint Vitus's dance; the roots of *Virginia snakeroot,* or *birthwort,* have tonic properties and have been used to cure rattlesnake bites. As a remedy for the latter, however, they have no real value. Another species, *Canada snakeroot,* or *wild ginger,* has stimulating properties and is also used as a spice. From *Senega snakeroot* an emetic is prepared.

SNAPDRAGON, *snap'drag un,* a genus of herbs bearing blossoms which, when pressed open and then released, fly shut with a gentle snap. Each flower consists of a tube, at the end of which are two closed lips. When the flower is pressed open it is these lips that snap together. The flowering stalks of the most commonly cultivated species, a native of Europe, grace all old-fashioned gardens and make ornamental borders for large flower beds. The velvety texture and the beautiful and varied colors give the blossoms great charm. The stalks, growing three feet high or more, are covered with fine, short hairs, and the small, smooth leaves are somewhat thickened. The common snapdragon lives from year to year, but some species must be grown from seeds each spring. Seeds are planted indoors early, and the plants are set out in May.

SNAPDRAGON

SNIPE, a bird found in freshwater marshes, related to the sandpiper, but differing from it by keeping closely to its cover of grasses and rarely venturing out except at night. The plumage is chiefly a mixture of brown, black and white. The one species found in North America is the *Wilson's snipe,* a bird dear to hunters both on account of its fine flavor and because its erratic flight taxes their skill. The bird is acrobatic in the air, and has a strange habit of "bleating" or "drumming," a sound that it produces by mounting to a great height

THE SNIPE

and then descending by one quick swoop after another, with the air rushing through its wings. Its summer range is from the Northern United States to Hudson Bay and Labrador, and it winters from Illinois and South Carolina southward. Its nest is a depression in the ground on the edge of marshes. The eggs are four in number and their color is olive-brown or grayish-drab, thickly spotted with chocolate.

The *European snipe* is similar to the Wilson's snipe except that it has a longer bill. The *Jacksnipe* is a very small species of the far northern sections of the Old World. South America has several snipes, including the *Giant snipe* of Brazil, a bird which grows to be nineteen inches long.

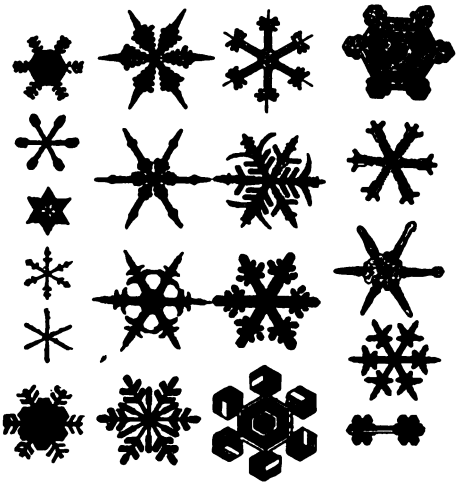
SNORING, *snohr'ing.* One can best describe the disagreeable noise made by a person who snores by saying that it sounds much like the word *snore.* The sounds are produced when the sleeper has his mouth open, and when the air, with every breath that is taken, gurgles through the throat with a hoarse, rattling noise. Some people snore simply from habit; the mouth drops open mechanically after one falls asleep. Certain mechanical devices for keeping the mouth closed have been tried, but without encouraging success. Some people advocate the use of a bandage, placed around the head and tied under the chin. When snoring is caused by nasal catarrh or throat trouble, as is often the case, the only remedy is treatment of the ailment. Children who snore should be examined for nose or throat trouble. In their case it is a danger signal that should not be disregarded. See EDUCATION, subtitle *Hygiene of Education,* especially the section on "Adenoids," page 1945.

SNORRI STURLUSON, *snor're stoor'loo son* (1179-1241), one of the earliest historians of Iceland, famed as the author of the *Prose Edda* (see EDDA) and of a series of biographies of old Norwegian kings entitled *Heimskringla.* The *Prose Edda,* completed in 1222, is one of the first masterpieces of Scandinavian literature, but was not published until the seventeenth century. Snorri early became prominent as a poet, lawyer and statesman, and in 1215 was made president of the legislative assembly and higher court of Iceland. In 1218 he visited Norway on the invitation of King Haakon, and when he returned home he became a vassal of the Norwegian king and negotiated a peace treaty between Iceland and Norway. After many years he lost the confidence of Haakon, and was put to death by the latter's order.

SNOW, *sno,* crystals of ice formed when cloud vapor is condensed at a point below freezing (32° F.). These crystals do not always reach the earth in the form of snow, for sometimes they are partially melted and reach the earth as sleet, and sometimes they are entirely melted and descend as rain. There are millions of boys and girls in the world who never saw a snowflake, for on over a third of the earth's surface snow never falls. Even in some portions of the United States there are children who do not know what snow looks like, who never see it—

> Flying through the cloudy sea
> Out of soft gray mystery,
> Lightly, lightly resting,
> On the old elm nesting,
> Hanging from the hemlock there
> Like a beard of silver hair,
> Molding on the lilac-tree
> Petals of white purity,
> Changing to a lovely frieze
> Ancient weeds forlorn and gray
> Shivering along the way.

Snowflakes are six-rayed ice crystals of different designs, some of which are shown in the accompanying picture. It is interesting to collect some of them on a black surface and to study them under an ordinary magnifying glass.



VARYING FORMS OF SNOWFLAKES

The designs of the flakes vary greatly and are marvelously beautiful. The amount of water in snow is much less than in rain, a rainfall of one inch being equal to a snowfall of about ten inches.

In polar regions and on the tops of high mountains snow falls all the time, whereas in temperate regions it falls during the winter months. The heaviest snowfalls occur in the

mountains of the cool temperate regions, such as the Alps and the Rocky Mountains. These heavy snowfalls have always been a grave danger to travelers through the mountain passes, and in Europe houses of refuge are maintained for the sake of protecting them. The most famous one is that in the Alps at the Saint Bernard Pass. Even twentieth-century travelers, on swift and luxurious trains, are endangered by the winter snows, the snowslides and the avalanches which occur in mountainous regions. The melting of the snow on mountains supplies water for streams and rivers. A.C.

Related Subjects. The following articles in these volumes will be of interest in this connection:

Avalanche	Ice
Crystallization	Snow Line
Freezing	Snowplow
Glacier	Snowshoe

SNOWBALL, or **GUELDER-ROSE,** *gel'der,* a handsome, flowering shrub that is often seen in parks and on lawns. It is a cultivated form of high-bush cranberry and grows from seven to twelve feet high. The first and more common name refers to the large, ball-like, white flowers, which grow in great profusion. The term *guelder-rose* is derived from the name of the Dutch province of Guelderland, where the plant is supposed to have originated. The flowers of the cultivated plant are all sterile, that is, do not produce fruit, but there is a wild guelder-rose that bears juicy, red berries.

SNOWBIRD. See JUNCO.

SNOW BUNT'ING or **SNOW FLAKE,** a sparrowlike bird which may be distinguished from all others by the large amount of white in its plumage. Not only on its body, but on its wings and tail as well, white predominates. Except in unusually cold winters, when the snowfall is very heavy, these birds do not venture as far south as the Northern United States, but in Canada they are among the most familiar of winter visitors. Their summers are spent in the Arctic regions. Ernest Thompson Seton says of this bird:

> In midwinter, in the far north, when the thermometer showed thirty degrees below zero and the chill blizzard was blowing on the plains, I have seen this brave little bird gleefully chasing his fellows, and pouring out as he flew his sweet, voluble song with as much spirit as ever skylark has in the sunniest days of June.

SNOW'DROP, a group of flowering plants of the amaryllis family, so named because they bear delicate white blossoms that seem to be made out of snow. The common snowdrop of the gardens is one of the hardiest of the out-of-door plants, for it has been known to bloom in mid-winter in localities where a warm spell has caused the surface of the ground to thaw. The snowdrop grows from a small, bulbous root, from which spring two or three narrow green leaves and a leafless flower stalk. The nodding, bell-shaped flowers grow singly at the top of the stalk, and usually come into blossom in northern climes in March or April. The plant is easily cultivated, for the bulbs can be planted in a sheltered place and be left to themselves. The snowdrop needs little attention. In England the peasants call it the *Fair Maid of February.* See AMARYLLIS FAMILY.

Snowdrops that plead for pardon. —SWINBURNE.

SNOW LEOPARD, another name for the *ounce* (which see).

SNOW LINE. Even in the torrid zone mountains rise into air that is so cold that snow lies on their upper slopes all the year. The lower edge of these permanent snow fields, in whatever country or zone, is called the *snow line.* It is about three miles above sea level in the tropics, approximately two miles above the sea in latitude 40°, and about a mile above sea level in latitude 55° or 60° north or south. It descends to sea level in the frigid zone, where permanent snow may be found even on the lowlands.

Related Subjects. The reader is referred to the following articles in these volumes:

Climate	Mountain
Irrigation	Snow

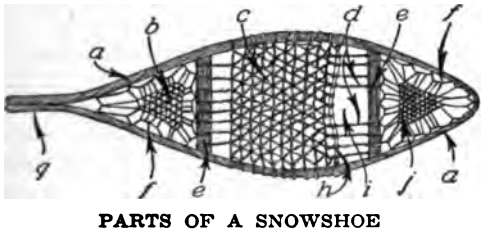
SNOWPLOW, a machine for clearing the snow from railways and roads. In the United States and Canada, where the snowdrifts are

of great depth and liable to be packed hard by violent winds, the railroads are usually cleared by a rotary plow, which consists of a wheel nine feet in diameter and provided with a series of knives or scoops. The wheel is kept revolving by a special engine, which is placed with the plow in front of a locomotive. The scoops feed the snow into a hopper, from which it is blown to a considerable distance by a powerful fan. With a rotary plow the deepest drifts can usually be penetrated.

Where the snow is not so deep a triangular plow, with its apex in the center of the track, is used. Pushed forward by a locomotive, the triangle forces the snow off the track at each side. The triangular plow is also used for clearing roads and sidewalks, but cannot be used in any great depth of snow.

The clearing of the railroads of the United States and Canada from snow annually costs many thousands of dollars, but so efficient have modern snowplows proved that drifts that would formerly have entirely suspended traffic can now be cut through with comparative ease.

SNOWSHOE, a contrivance to aid in walking on snow, consisting of a light wooden frame, bent in an elongated oval or nearly circular shape, across which is stretched a web made of deerskin thongs, strung much like a



PARTS OF A SNOWSHOE

(*a, a*) Frame, or bow; (*b*) heel filling; (*c*) center filling; (*d*) toe stays; (*e, e*) crossbars; (*f, f*) lanyard; (*g*) tail; (*h*) toe cord; (*i*) toe hole; (*j*) toe filling.

tennis racket (see illustration). Snowshoes provided with supports and holders for the feet, which are protected by moccasins and other wrappings. The principle applied is that of distributing the weight of the body over a wide surface and thus enabling the yielding surface of the snow to support it. Such shoes are used by hunters, trappers, loggers and farmers in countries where the snowfall is deep.

In addition to these practical uses, in the principal cities and towns of Canada there are clubs founded whose members find them a means of recreation for the long winter evenings. The styles of shoes vary according to the use to be made of them and the surface features of the country where used. A nearly round form is known as the *Montagnais,* or mountain shoe. Long and narrow shoes are known as the *Klondyke;* there are all forms between the two. The Indian village of Lorette, ten miles from Quebec, is noted for its manufacture of snowshoes, and Hudson Bay Fur Company manufactures them in large quantities for its trappers. They cost from $2.50 for cheap shoes to much higher prices for finer qualities.

The snowshoe as used in the United States and Canada was originated by the Indians, and the most expert users of them to-day are the half-breed trappers of Eastern Canada. A novice will find it hard to walk even at a slow pace when wearing snowshoes, but expert trappers will walk for hours at a rate of five or six miles an hour on a good, hard-surfaced snow, and many will run at a "dogtrot," covering easily thirty-five or forty miles a day.

In wearing snowshoes care should be taken not to tie the thongs or straps, that fasten the shoe to the foot, too tight. Beginners in the use of snowshoes usually suffer from this cause. The thongs should be crossed over the toes and round the ankles loosely, allowing free play to ankle and instep. On no account should the tightness of the thongs prevent the free rise and fall of the heel. The wearing of snowshoes makes it possible, and easy, to walk across snow-covered areas in which one without them would sink to a depth of five or six feet, a by no means uncommon depth in the woods of Canada. F.ST.A.

SNUFF, a fine powder made from the stems and leaves of the tobacco plant, which have been fermented by heat and moisture, then dried and ground. Snuff is inhaled through the nostrils or rubbed on the gums. Various mixtures of flavors or scents are added to make the powder pleasant for inhaling. Formerly it was considered a matter of etiquette to offer "a pinch of snuff" to friends whom one met, for each person carried a snuffbox. This practice is still prevalent in Southern Europe, and many illusions are made to it in literature. Pope says in the *Rape of the Lock*—

> Sir Plume, of amber snuff box justly vain,
> And the nice conduct of a clouded cane.

The habit of taking snuff is very injurious. One of its effects is irritation of the nerves of smell and consequent deterioration of ability to distinguish odors. A user of snuff is deprived of his best protection against foul air. See SMELL.

SOAP, *sohp.* During the War of the Nations, which had so marked an effect on the supply of innumerable raw materials, soap advanced in price and deteriorated in quality in many localities, and in some sections in Europe it could not be obtained at all. These conditions were the result of a great scarcity of fats, for fats are the basic materials in soap manufacture. Those generally employed in making this important aid to cleanliness include tallow, lard oil, palm oil, olive oil, cottonseed oil, cocoanut oil, corn oil, stearin and crude oleic acid.

How Manufactured. Rosin, or laundry, soaps are made from tallow, which may be mixed with grease or oil. In the course of the manufacturing process rosin is added to give the soap its characteristic yellow color. The fatty material, known technically as *stock,* is poured in a liquid state into a sheet-iron kettle heated by steam coils. During the heating process lye is added to the mixture from time to time, and when the contents have the appearance of a thick gum, saturated salt solution is added until the soap floats on the surface. The mixture is then cooled, and in this process the brine sinks to the bottom of the kettle. The brine is then drawn off and worked for glycerine and salt, while to the soapy layer fresh, strong lye and rosin are added. The resulting mixture is heated until the rosin is thoroughly united with the soap. Then a salt solution is added as before, the lye is drawn off, fresh, strong lye added and the mass boiled again. After further cooling, settling and reheating, and the addition of cold water, the contents of the kettle are allowed to cool off slowly to a temperature of about 65° C.

The soap is next run into a horizontal revolving cylinder known as the *crutcher,* in which it is stirred until the mixture is of a uniform color and texture. Various chemicals, such as carbonate of soda, are added to improve the quality. Finally the mixture is run into molds where it is allowed to harden into huge cakes. These are cut into bars of market size by steel wires.

Toilet soaps require several other processes, but the crutching operation is omitted. These soaps are usually scented with various ingredients, and they also have different coloring matters added. Cheap, highly scented soaps should be avoided, as the perfume is often added to disguise the presence of offensive fats. As a general rule, a healthy skin is best served by the use of a soap made from pure oil and good soda. Many medicated soaps advertised in the markets are frauds, and the advice of a reliable physician should be sought if one is tempted to try a soap for a skin disorder. Transparent soaps contain alcohol and glycerine, and floating soaps are usually a mixture of tallow and cocoanut oil, potash and soda. Sailors use what is known as *salt-water* soap, made from cocoanut oil, potash, soda lye and salt. The popular Castile soap is made from olive oil and soda or mixed potash. The so-called naphtha soaps usually contain kerosene. O.B.

Consult Deite's *Manual of Soap Making;* Carpenter's *Treatise on the Manufacture of Soaps and Candles, Lubricants and Glycerine.*

SOAP'STONE. See STEATITE.

SOCIAL DEMOCRATS, *so'shal dem'o krats.* In its widest sense this name is applied to the Socialists of every country whose appeal is international in its scope. Politically, the term applies to the Socialist party of Germany, which was established by Lassalle in 1863 with a very simple program—the demand for universal male suffrage. At the time of Lassalle's death in 1864 the Social Democrats numbered 4,610. The International Union of Workingmen, founded by Marx and Engel in 1864, united with the followers of Lassalle in 1875 to form anew the Social Democratic party as it exists to-day.

So rapid was the spread of the Socialist doctrines that the vote at the first election was nearly half a million and resulted in very severe anti-Socialist legislation under the Bismarck government. In spite of this the vote had increased by 1890 to 1,427,000, by 1903 to 3,008,000, and by 1914 to 4,500,000. The Socialists of Germany now command over a hundred seats in the governing body of Germany, and hold the balance of power. With the opening of the War of the Nations the Social Democrats were split into two factions, those who supported the government in declaring war, and those who repudiated its action. The leader of the antiwar Socialists, Karl Liebknecht, was banished from the Reichstag and silenced for the duration of the conflict.

The Social Democratic Workingmen's party was founded in the United States in 1869. It soon changed its name to the Socialist Labor party, and an offshoot of it became known as the Social Democratic party. The term is little used, however, the Socialist party of America being the popular designation.

See article SOCIALISM, and its list of related topics.

SOCIALISM, *so'shal iz'm,* a political world movement which seeks to adjust the relation of the individual to the community by means of collective ownership and management of the principal means of production and distribution.

The term *socialism* seems to have appeared first in England in 1833, in a paper called *The Poor Man's Guardian,* during discussions which arose in regard to an organization called the *Association of All Classes of All Nations.* As this society was for the purpose of social reconstruction, the name was considered well applied. French and German writers recognized the term and it soon came into general use, but it was in Germany that it first acquired political significance. The word has been much abused, having been used to describe communism, anarchism and almost everything of a revolutionary nature in the political world. The only proper use of the word to-day is in its application to one of the most remarkable movements of the nineteenth century, that of the so-called Socialist party, which is the only political party with an international alliance.

In the United States. The development of the theory of social evolution and the spread of socialism as a party movement have been rapid in America. In 1888 the Socialist vote in the United States was 2,068, in 1904 it had grown to 442,402; in 1912 it was but little below 1,000,000, but in 1916 it fell to 594,095. In the national headquarters of the Socialist party of the United States in Chicago are maps dotted with colored pinheads showing the location of the local organizations. These pins are as numerous in some of the agricultural states as in the industrial states, showing that the membership is not confined to factory employees.

The best means of determining what are the principles of socialism as held by adherents of the party in the United States is to study the "working program" or platform of the party, which is regarded as a definite pledge to the members.

The working program of 1916 stated that its measures are calculated to strengthen the working people in their efforts to effect a coöperative commonwealth, which is the ultimate aim of the party, and to increase the power of resistance against what is termed capitalistic oppression. The platform is stated under three heads, Collective Ownership, Industrial Demands and Political Demands; with the latter is included Unemployment Demands, seeking to secure government employment for all men out of work.

Collective Ownership includes the ownership and management by all its holders of railroads, telegraphs and telephones, express service, steamboat lines, "and all other social means of transportation and communication and of all large-scale industries." It includes the immediate acquirement by the government of such agencies as can be made to reduce the cost of living, as grain elevators, stockyards and storehouses. It asks for government ownership of mines, quarries, oil wells, forests, water power, and the conservation and development of all natural resources for the benefit of the people. The collective ownership and democratic management of the banking and currency system is required; the collective ownership of land wherever practicable, and where not practicable, an appropriation by taxation of the rental value of such land as is held for speculation or for exploitation of any kind.

The Industrial Demands are for the better protection of workers and their families. They include the shortening of the work day, in proportion to the increasing productiveness of machinery; the securing to every worker a rest period of at least a day and a half each week; the securing of better inspection for workshops, factories, mines, etc.; refusal to employ children under eighteen; a plan for giving convicts and their families the benefit of convict labor; the forbidding of interstate transportation of the products of convict labor, child labor, and that of uninspected factories and mines; the abolishing of the profit system in government work and substituting either the direct hire of labor or the awarding of contracts to coöperative groups of workers; the establishing of a minimum wage scale; the abolishing of public charity and substituting a system of old age pensions and social insurance which shall protect every worker against unemployment, sickness and accident. Mothers' pensions are also demanded.

The Political Demands are absolute freedom of press, speech and assemblage; increase in the rates of the income tax law; increase of rates of corporation tax; the extension of inheritance taxes, graduated according to the value of the estate and the nearness of the kin, and the use of the proceeds from all such taxation to be for the socialization of industry; the abolition of personal or corporate ownership of patents, and the substitution of collective ownership, with a system of direct payment of the inventors by the government, by means of premiums or royalties; unrestricted and equal

suffrage for men and women; universal adoption of initiative, referendum, recall, and proportional representation; the abolition of the veto power of the President; the abolition of the Senate; election of President and Vice-President by direct vote; abolition of the power of the Supreme Court of the United States to pass upon the constitutionality of the laws enacted by Congress; repealing of national laws by referendum vote of the people; abolition of restrictions upon amendments of the Constitution, so that it may be amended by a majority vote of the people; granting the right of suffrage in the District of Columbia, with representation in Congress, and a democratic form of government for local affairs; a democratic form of government for all United States territory; the Bureau of Education to be raised to the rank of a department of the government; extended measures for general education with a plan for vocational training in the useful pursuits; a Bureau of Health and further measures for the conservation of health, with full liberty to all schools of practice; the abolition of Federal District Courts and of United States Circuit Courts of Appeal; a law by which state courts shall have jurisdiction in cases between citizens of the various states and foreign corporations; the election of all judges for a short term; curtailing the power of courts to issue injunctions; the free administration of the law; the calling of a convention for the revision of the Constitution of the United States.

As a World Movement. The International Socialist party is represented in every country that has reached an industrial stage. In 1901 the Canadian Socialist League was organized, and while the Socialist vote in Canada has not been large, there has been a steady growth noticeable at all elections. In Australia and New Zealand the Socialist party as such has been kept in the background by the powerful labor parties which have led the industrial reforms, but the Socialists claim that the labor parties, too, are working toward social democracy. The South American republics know socialism, and there is a Socialist party in Japan. The movement is strongest in Germany, France, Russia and England. The great industrial revolution in England during the last quarter of the eighteenth century and the French Revolution during a part of the same period were factors in the movement in Europe.

German Socialists have a great deal of power in the government, as they form the largest political party in the Empire. In France socialism has a strong influence in national affairs, with considerable representation in the Chamber of Deputies, and the party has achieved a number of victories in municipal affairs. Several Socialist organizations in England have worked together under the name of the Labor Party and have achieved considerable success, with a representation in Parliament of over forty members. E.D.F.

Consult Spargo's *Socialism;* Hunter's *Socialists at Work;* Hardie's *From Serfdom to Social Reformer;* Hillquit's *Socialism in Theory and Practice.*

Related Subjects. The following articles in these volumes will make clear many of the references in the above discussion of socialism and will give added information:

Anarchism	Minimum Wage
Child Labor	Mothers' Pensions
Communism	Old Age Pensions
Convict Labor	Recall
Income Tax	Sabotage
Inheritance Tax	Social Democrats
Initiative and Referendum	Suffrage
Labor, Department of	Syndicalism
	Vocational Training

EMINENT SOCIALISTS

Bebel, Ferdinand A.	Proudhon, Pierre Joseph
Lassalle, Ferdinand	Saint-Simon, Count de
Marx, Karl	

SOCIAL SETTLEMENT, an institution that represents one phase of the great modern movement for the uplift of humanity. Social settlements are neighborhood centers of helpfulness, located in sections of great cities where there is a never-ending struggle with poverty, vice and ignorance. In these centers men and women of education and culture live and work, coming in personal contact with the sordid and disheartening conditions that surround their less fortunate brothers and sisters. As they strive to bring into the lives of these people something that will lift them above the old level, they themselves are working out the solution of many social and industrial problems.

Social settlements carry on many activities, as kindergartens, schools in citizenship, clubs, classes, libraries, baths, savings banks, etc., and they usually keep open halls where community groups may hold social, political or religious gatherings. They are headquarters for all kinds of welfare movements, and often institute reforms that are afterward taken up by the city or state. Their influence reaches far beyond the communities in which they are located, and their residents pass on to the whole educational world the information that they have gained first hand.

The first social settlement was founded by men of Oxford University, in London, in 1884. It was the outgrowth of the work begun in Whitechapel, a crowded district in East London, by Arnold Toynbee, and is known as Toynbee Hall. In 1887 Dr. Stanton Coit established the neighborhood Guild in New York, which grew later into the University Settlement. In 1889 Jane Addams and Ellen Gates Starr of Chicago opened Hull House, now one of the best-known social centers in the United States. Since that time settlements and settlement methods have become common in cities, especially in the United States. M.A.H.

Consult Addams' *Twenty Years at Hull House;* Coit's *Neighborhood Guilds.*

Related Subjects. The reader is referred to the following articles in these volumes:

Addams, Jane	Hull House
Community Interests	Tenement

SOCIETY FOR THE PREVENTION OF CRUELTY TO ANIMALS. See CRUELTY TO ANIMALS, SOCIETY FOR THE PREVENTION OF.

SOCI'ETY ISLANDS, or **TAHITI ARCHIPELAGO,** *tah'he te ark i pel'a go,* a group of islands in the South Pacific, forming a colony of the French Republic. The islands were officially annexed in 1880. They lie directly east of Australia, about midway between that continent and South America, and about 1,000 miles south of the equator (see colored map, with the article OCEANIA). There are two well-defined divisions of the archipelago—the Leeward and Windward groups. As the largest of the islands, Tahiti (in the Windward group), is 600 square miles in area, and the total area of the archipelago is about 650 square miles, it will be seen that the rest of the islands are of very limited extent. The total population is estimated to be 15,000; nearly 12,000 of the inhabitants live in Tahiti. The natives are a fine type of Polynesians.

The group's highest peak (7,000 feet) is on Tahiti, but all of the islands are volcanic and mountainous, with coral reefs along their shores. At the extreme north in Tahiti is Point Venus, from which astronomers view the transit of Venus. Bananas, cocoanuts, sugar, the vanilla plant and fruits grow in abundance in the fertile soil, but only a small proportion of the tillable land is cultivated. Copra, mother-of-pearl, vanilla, cocoanuts and oranges are exported. Papeete, the chief town and the capital of the French establishments in Oceania, is situated on Tahiti and has a population of about 3,600. This town has a cathedral, a higher primary school and a normal school, and there are several mission schools in various parts of the archipelago. There is regular steamboat service between Papeete and San Francisco, New Zealand and Australia.

SOCIETY OF JESUS. See JESUITS.

SOCIOLOGY, *so shi ol'o ji,* the study of the human race, including its history, evolution and future, the laws which govern its development and the place of the individual in relation to society. The scope of sociology is boundless. History, ethnology, civics, economics, anthropology, ethics, psychology, philosophy, and, above all, biology—all the sciences which treat of human beings and the conditions under which they live—are related to and contribute to sociology. This science rests on the assumption that all human experience depends on three things: the physical conditions under which life is maintained, the relation of the individual to other individuals and to society, and the types of association in which individuals influence each other. Before it can begin its research, sociology must have data on all these subjects, and so it goes for its statistics to the other social sciences. With the data which he gathers from every source, the sociologist endeavors to fix the laws of the reactions between nature and human beings, both as individuals and in the group; he is studying the evolution of human personality, the processes which result in types of individuals and of associates, types which act on each other in an endless cycle of cause and effect.

Other sciences—physics, chemistry, mathematics—rest on unchanging, invariable laws. They are exact; they never change from age to age: given certain conditions, certain results are inevitable. Auguste Comte, when he first formulated sociology and gave it its name, held that it, too, might be an exact and invariable science; but not to-day, and probably not for thousands of years to come, can the laws which govern human experience be standardized. Biology, the study of all life, is the great foundation for the study of human life, and biology is even now in an unfinished state. Fundamental truths of biology still remain mysteries. The laws which govern the vital germ in every form of life, which determine color, form and sex, and, in higher planes of life, disposition and character, still evade the most ardent seeker. Theories and hypotheses abound. We seem, little by little, to be coming nearer the truth. Perhaps, philosophers

say, after a long time—hundreds of years or hundreds of centuries—these laws will all be manifest: the biologist will be able to formulate rules as fixed and as changeless as the ratio of one number to another, and in that day biology will become an exact science; and when biology is exact, sociology, too, may be exact.

The four classes in the formal study of sociology—each class, in turn, is divided and subdivided—are (1) *descriptive sociology,* which includes all the preliminary work of stating observed phenomena; (2) *social psychology,* which covers the study of the mind of primitive man, the mental workings of the masses, from the mob to the nation; (3) *social ethics,* the formation of theories, hypotheses and judgments on human conduct and the definition of social aims; and (4) *social technology,* the application of known social facts to the bettering of social conditions. The true sociologist, loving his science, might well take his motto from Terence: *Humani nil a me alienum puto*—"I consider nothing human to be unimportant to me."

Consult Strong's *New World-Religion;* Hayes' *Introduction to the Study of Sociology;* Blackmar and Gillins' *Outlines of Sociology.*

Related Subjects. In connection with this discussion of sociology, the reader will find much that is of interest in the articles on the contributing sciences named above. He may also consult the following:

Alcoholic Drinks	Illiteracy
Census	Juvenile Court
Charity	Marriage
Child Labor	Mothers' Pensions
Children, Societies for	Old Age Pensions
Communism	Oneida Community
Community Interests	Pauperism
Crime	Polygamy
Debt	Population
Divorce	Prohibition
Emigration and Immigration	Registration of Births, Deaths and Marriages
Environment	Socialism
Eugenics	Social Settlements
George Junior Republic	Suicide
Heredity	Temperance
Hull House	Tenement

SOCRATES, *sok'ra teez* (469-399 B. C.), one of the greatest of the Greek philosophers, was born in Athens. He received only a meager education in his youth, but later became familiar with the best philosophy and thought that the highly-cultured Athenian society could offer. For a time his career was that of sculptor, but soon he began to walk the streets and market places, talking to anyone he might meet regarding his soul and the moral life of man in general. From 432 to 429 B. C. he served in the campaign of Potidaea, fought at Delium in 424 and at Amphipolis in 422. He refused to take further part in public affairs after the naval battle of Arginusae, when the mob unjustly demanded the death of ten generals who had been unable to bury the dead; likewise, he opposed tyranny when the thirty tyrants commanded him to help bring about the arrest of the innocent Leon of Salamis.

Socrates * * *
Whom, well inspired, the oracle pronounced
Wisest of men.
—MILTON: *Paradise Regained.*

As a teacher, Socrates was not popular among the citizens of Athens. His personal appearance was against him, for he was bald, had thick lips, a flat nose, ungainly figure and beggarly costume. He tried to reduce his wants to a minimum in order thus more closely to resemble the gods in their perfection. His wife Xanthippe has passed into tradition, possibly without proper basis of truth, as a scolding, arrant shrew whom he endured as a form of self-discipline.

He had many illustrious friends, among them Plato, Crito, Alcibiades, Xenophon, Phaedon, Euclid of Megara and Aristippus. However, his chief work was among the Athenian youths, whom he felt called upon to conduct through love to a nobler moral life. Self-knowledge was his ideal; "Know thyself," his maxim. To him wickedness was the result of ignorance. The good, the useful and the beautiful were declared by him to be identical. No man is willingly bad, he argued, and virtue in itself can be taught. The best rulers are those who are wisest, not the best educated, necessarily, for they will most readily know how to make the people happy.

His method, known as the Socratic, became famous throughout the Mediterranean countries. It was an art of cross-examination which lured even the wisest into contradictions. He veiled his own knowledge behind a professed ignorance and by a series of carefully directed questions brought out from his hearers the truth he sought.

In 399 B.C. he was condemned to death because he had introduced new gods and failed to worship the city divinities, and because of corrupting the youth. During his trial he gave the famous defense known as the "Apology of Socrates," but the jury, consisting of over 500 members, condemned him by a small majority. On the morning of the day of his death his scolding and quarrelsome wife Xanthippe was banished by him from his cell because of the violence of her grief. He is said to have spent the last hour in tranquillity, discoursing with friends on the immortality of the soul. When twilight appeared he drank the poison hemlock, the cup reserved to those condemned, walked up and down, then lay down on his couch and died in quiet.

The Socrates who frequently exclaimed, "How many things there are that I do not need,"

PRISON OF SOCRATES, AT ATHENS
In one of these dungeons, hewn in the rock, the philosopher spent his last hours.

Plato eulogized as follows after his death: "Thus died the man who of all with whom we are acquainted was in death the noblest, in life the wisest and most just." E.D.F.

Consult Wright's *Short History of Greek Literature;* Gomperz's *Greek Thinkers;* Forbes' *Socrates.*

SO'DA, the general name of several sodium compounds occurring in nature in natural alkaline waters. The term *soda* is employed more commonly, however, to designate certain commercial compounds used in the household and in the industries. The sodas of commerce are manufactured by various processes from common salt. One kind, known in chemistry as sodium carbonate, is employed in the manufacture of glass and soap, as a disinfectant and as a cleansing agent. Common names of sodium carbonate are *sal soda* and *washing soda.* Sodium bicarbonate is the common *baking soda* or *saleratus* used with sour milk or cream of tartar to raise bread, biscuits or pastry. It is also an ingredient of baking powder (which see). When heated or when mixed with an acid, sodium bicarbonate gives up carbon dioxide, and the escaping gas puffs up the dough. Sodium bicarbonate is used in medicinal preparations for the relief of acidity of the stomach, and is one of the two compounds that make up Seidlitz powders (which see). *Caustic soda,* known in chemistry as sodium hydroxide, is used in making hard soap, paper and dyestuffs, and in bleaching and kerosene oil refining. See SODIUM.

SODA WATER, a pleasant, effervescing drink made of water charged with carbon dioxide and flavored with syrups. The carbon dioxide is stored in steel cylinders under great pressure, and the water is in a strong steel or copper tank. When the liquid carbon dioxide is allowed to escape into the water it instantly changes to gas, which is dissolved in the water until the required pressure is reached, when the process is stopped. The pressure in the tank forces the water into the pipes in the fountain, and when it is drawn the rapid escape of the gas causes the water to effervesce. Pop, ginger ale and numerous other soft drinks consist of water flavored with a syrup and charged with carbon dioxide. The chief difference between them and soda water is that they are bottled when charged with the gas, while soda water is prepared by mixing the flavoring syrup and the water in the glass. There is no soda in soda water. It was so named because formerly bicarbonate of soda was used in preparing the carbon dioxide for charging the water.

Soda water was an unknown beverage in England until about 1908, when an American, Harry J. Selfridge, established a great department store in London and invested a large sum in a modern "soda fountain." The new drink became very popular.

SO'DIUM, a soft, silvery-white metal that is never found free in nature. Sodium is as soft as wax and lighter than water. It has great affinity for oxygen, and has to be kept in kerosene or naphtha, liquids that contain no oxygen. When thrown upon cold water it decomposes so rapidly that the heat generated melts it; when thrown upon hot water the decomposition sets the hydrogen on fire, and it burns with a bright yellow flame because of the presence of sodium vapor.

Sodium exists in large quantities in its chloride (common salt) and its nitrate (soda saltpeter). It is manufactured for commercial purposes by electrolysis (which see) of sodium

hydroxide or caustic soda. Sodium is used in the laboratory for extracting water from alcohol and ether, and in the manufacture of some compounds. The uses of salt and soda saltpeter are described under the headings SALT and SALTPETER. Sodium arsenate is used in place of arsenic (which see), and the bromide and iodide are employed as remedies in nervous disease.

SOD'OM, one of the ancient cities of the plain north of the Dead Sea. It lay in a region described in *Genesis* XIII, 10, as having been "like the garden of the Lord," till Sodom and Gomorrah, a neighboring city, were overthrown by God because of the extreme wickedness of their inhabitants. It was at the time of the destruction of Sodom that Lot escaped in safety, while his wife, lingering on the way, is said to have been turned into a pillar of salt. The fate of Sodom and Gomorrah is repeatedly mentioned in the Bible. Jesus himself, when exhorting His disciples to steadfastness (*Luke* XVII, 32), used the admonition, "Remember Lot's wife."

SODOM, APPLE OF, a fruit said to be beautiful to the sight, but to fill the mouth with bitter ashes when tasted. In early literature it is recorded as growing near the shores of the Dead Sea. By many it is considered to have been merely legendary, while others attempt to identify it with one or another of the plants now growing in that region. Some believe it to be a species of gall found on dwarf oaks (see GALLS). The only Bible passage that can be said to refer to this fruit is that found in *Deuteronomy* XXXII, 32:

> For their vine is the vine of Sodom,
> And of the fields of Gomorrah:
> Their grapes are grapes of gall,
> Their clusters are bitter.

SOFIA, *saw'je ya,* known as SREDEC (*sreh' dets*) by the Bulgarians, the capital and largest city of Bulgaria, is situated in the western part of the country on an elevated plain 1,800 feet above the sea. It is on a line of railway that after the entrance of Bulgaria into the War of the Nations (which see) was opened from Berlin to Constantinople. The latter city is 300 miles southeast of Sofia (see map of Europe, following page 2092). Most of the modern part of the city has been rebuilt since 1878, and enjoys such innovations as street railways and electric lights.

Among the notable buildings are the palace of the king, a cathedral, the buildings of the university (founded in 1888 and having an enrolment of about 2,200 before the war), a large theater and the government buildings. Sofia is the foremost railroad and industrial center of Bulgaria; it has thriving manufacturing establishments and carries on a prosperous export trade in foodstuffs, attar of roses and hides. The present city is on the site of a Roman town called Sardica. In the older portion are some famous mineral springs. Sofia was bombarded by allied airships during the War of the Nations. Population in 1910, 102,812. See BULGARIA.

SOIL. The greater part of the earth's surface is covered with a layer of loose particles, varying in depth from a few inches to several feet. This layer is called *soil.* To the geologist the entire layer is soil, but the agriculturist includes in his idea of soil only those portions that are suitable for the production of plants.

Formation of Soil. The processes that form soil have been in operation from the remotest geological ages, and they are still active. The chief agencies in its formation are the atmosphere, water, plants and animals.

Work of the Atmosphere. Air is composed chiefly of nitrogen and oxygen, and oxygen is the most active chemical agent known. Under the influence of moisture it attacks the rocks and causes them to decay and crumble; the fine particles formed in this way are added to the soil. Again, in dry regions high winds wear away the rock by driving against it particles of sand which they carry, and the particles thus worn away are carried in the air until they fall to the earth and are added to the soil. The peculiar forms of rocks in the Bad Lands of South Dakota and other localities are fashioned by wind. In sandy regions sand dunes or drifts are formed by the wind, and in other localities fertile soil is often carried greater or less distances and added to the soil of the region where it falls.

Work of Water. Water is by far the most important agent in the formation of soil. Running water will wear the hardest rock, and since nearly all running water carries sand and gravel, these assist in wearing the rocks over which the stream flows. The particles worn off are carried downstream until deposited on its bed or banks, forming the great alluvial deposits which characterize the lower portions of the valleys of great rivers; these formations contain some of the most fertile soil in the world.

Rain and snow assist the atmosphere in breaking rocks into small fragments. When

water freezes the ice occupies more space than the water; we have seen pitchers broken by the freezing of the water in them. When water freezes in the crevice of a rock it works in the same way and makes the crevice larger, so that in the course of a number of years the piece of rock is broken off. If we examine the base of any rocky cliff we shall find an accumulation of pieces of various sizes, ranging from those weighing hundreds of pounds to tiny particles of soil. This mass of loose rock at the foot of a cliff is called *talus*. In addition to this, repeated freezing and thawing of water on the surface of rocks constantly wears them away, forming soil. This process is known as *weathering*. Water also acts chemically, since the oxygen in it attacks substances that have been dissolved from the rock.

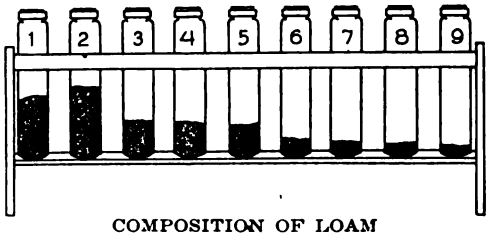
In past geological ages great glaciers covered most of the northern part of North America, and by their movement crushed and ground the rocks into soil, which they deposited where they melted. Much of the soil in Canada and in the United States north of the Ohio River and east of the Mississippi was formed by glaciers (see GLACIER).

Work of Plants. The roots of plants, the leaves of trees and the stems of all plants that are allowed to stand and die down in the fall, decay and become a part of the soil. Moreover, the roots, by extracting certain plant food from rocks, help to break them up. Sometimes large rocks are split apart by the roots of trees. Certain minute plants, such as molds, grow on decaying plants and hasten the process of changing these plants to soil.

Work of Animals. Animal waste is constantly added to the soil, and sooner or later the animal dies and its body decays and becomes a part of the earth. Animals not only add to the soil, but they are important agents in mixing the soil. Gophers burrow in the alfalfa field and damage the crop. Woodchucks burrow in the clover field and make mounds that are a hindrance to the farmer, and he attempts to destroy these and all other burrowing animals; yet in all ages these animals have performed an important part in making soil. But the small members of the animal kingdom, such animals as the earthworm and the ant, perform a work of far greater value. An authority on agriculture says, "Each ant hill is a real soil-mixing mill."

Earthworms burrow in damp, rich soil and derive their nourishment from the animal and vegetable matter it may contain. In order to obtain their food these worms eat the earth but reject the portion containing no nourishment. In passing the soil through their digestive system the worms pulverize it and cast it forth in a highly fertile state. Darwin estimated that in England these worms brought to the surface more than ten tons of dry mold to the acre. Air enters the soil through the holes made by the worms and aids in the decomposition of substances beneath the surface.

Transportation of Soil. We often find the soil on one side of a hill or valley to be very different from that on the other. This is because the soil in one place has been brought there from some other locality, probably by water or ice, and that in the other place is still lying where it was formed. We have already seen that rivers carry soil to the lower part of their course. Rain washes the soil down the slopes of a hill and deposits it on the lowlands. Here the soil is deeper on these lands than on the hillsides. As water carries the soil it also sifts it. In the upper course of the stream, where the current is usually swift, all grades of soil, including coarse gravel, are swept along, but as we go downstream the soil becomes finer and finer, until in the lower course only the finest silt is carried.



COMPOSITION OF LOAM

In twenty grams (about seven ounces) of loam the constituent parts are as follows:

1. Organic matter—humus
2. Very fine sand
3. Clay
4. Silt
5. Fine sand
6. Coarse sand
7. Medium sand
8. Gravel
9. Fine silt

Kinds of Soil. Soil is classified according to its composition and according to its structure. Soil contains mineral (inorganic) and animal and vegetable (organic) matter. The minerals in soil are chiefly clay, sand and lime, the last of which is in the form of pulverized limestone. The organic matter, consisting of decaying animal and vegetable substances, such as leaves, twigs and the dead bodies of animals, is called *humus*. A clay soil is more than one-half clay; a sandy soil is at least one-half sand. A loam is a soil in which clay, sand and humus are mixed in about equal proportions. Since humus is necessary to fertility, loams are the most

desirable soils for agricultural purposes. Loams are classified as clayey, sandy, heavy or light, according to their composition. Each is specially fitted to certain crops.

Soils are coarse or fine according to their texture. Fine soils are the more desirable for agriculture, because they contain a larger proportion of humus and also hold water better. Each particle of soil is surrounded by a thin film of water like that on a marble that has been wet. This is the water used by growing plants. Free water drowns the roots and prevents them from absorbing nourishment, so that plants die where there is too much water. Since clay holds water, a certain proportion of clay is necessary to fertility. Sandy soils are infertile, because they do not hold water and because they usually lack the necessary proportion of humus. This may be supplied in a measure by fertilizers. W.F.R.

Consult Brooks's *Soils and How to Treat Them;* King's *The Soil;* Hopkins' *Soil Fertility and Permanent Agriculture;* Snyder's *Soils and Fertilizers;* Hall's *Soils.*

Related Subjects. The reader who is interested in a study of soils will find much that is of interest in the following articles in these volumes:

Agriculture	Loam
Clay	Loess
Drainage	Manures
Dry Farming	Marl
Erosion	Phosphates
Fertilizer	Rotation of Crops
Irrigation	Sand

SOKOTO, *so'ko toh,* an important state forming part of the British protectorate of Nigeria, in the west-central Sudan country, North Africa. It borders on the Sahara Desert, and in the northern part consists of arid lands, becoming more fertile, however, in the southern portion. It covers an area of over 100,000 square miles and has a population estimated at 10,000,000. The chief town is Sokoto, with a population of 10,000, but the most important commercial center is Kano.

The chief industries are agriculture and cattle raising, the cattle being exceptionally fine, though subject to great loss through plague. The production of coffee is increasing, but the principal products are hides, barley, millet and wheat. British courts of justice have been established, and the country is being opened to large foreign commerce. Ostrich farming has been introduced, and gives promise of being eventually successful. Occasional rebellions against British influence occur, but are usually put down without serious trouble.

SOLANUM, *so la'num,* the typical and most important genus of the nightshade family of plants. It includes herbs and shrubs of more than 500 species, especially abundant in tropical America. The most common and important species is the common potato, and another is the tomato. Other well-known species of temperate regions are the bittersweet and the common nightshade, which are widely distributed throughout America and Europe, and the horse nettle and other spiny, troublesome weeds native to the United States. Several species, long ago used as medicine, are still employed by the Chinese as medical remedies. The fruits of many East Indian varieties are eaten, and a species known as the kangaroo apple is a common food in Australia and New Zealand.

Related Subjects. The following members of the genus are treated in these volumes:

Bittersweet	Potato
Eggplant	Tomato

SO'LAR ENGINE, or **SUN MOTOR,** a mechanical device for collecting heat from the sun and utilizing it as motive power. The name is derived from the Latin *solaris,* meaning *sun.* The most successful solar motor yet invented was erected at Pasadena, California, in 1901. It consisted of a huge mirror in the shape of an umbrella, thirty-six feet six inches in diameter at the widest end, tapering off fifteen feet at the bottom. The disk contained 1,788 small mirrors, so arranged that the sun's rays might be concentrated upon a boiler containing 100 gallons of water and space for eight cubic feet of steam. The boiler was connected with machinery that pumped water at the rate of 1,400 gallons per minute. By an automatic arrangement, as soon as steam was developed in the boiler, the mirror was connected with clockwork which caused it to turn with the sun in its course.

It was thought that the solar motor would lead to great development of arid lands by providing cheap means of running irrigation pumps, but little has been accomplished in that direction. The heat developed by solar motors is intense. A solar motor, or burning mirror, as called in England, developed heat which melted a piece of iron in sixteen seconds.

SO'LAR MICROSCOPE, *mi'kro skohp,* an instrument for casting a magnified image of a small object upon a screen by means of sunlight or artificial illumination. It consists of a brass tube and a reflecting mirror, so adjusted that the rays of light are reflected into the

tube. The object to be magnified is placed on a stage at the opposite end of the tube. The tube is attached to the inside of a closed window shutter, being placed over a hole. A double-convex lens collects and brings to a focus on the object the light rays, and by means of a second lens a magnified image of the object is projected on a white screen. Modern instruments usually make use of the electric arc or oxyhydrogen limelight instead of the sun's rays. The solar microscope is similar to a stereopticon (which see).

SO'LAR SYS'TEM. When you hear someone speak of the sun as "Old Sol" you gain the impression of a friendly relationship, as though the huge ball of fire in the skies were a man to whose faithful care we owe our light, our heat, and an even more valuable possession, the genial sunniness of heart which we feel on pleasant days. There are a great many members of "Old Sol's" family—the solar system, as it is scientifically called—for our own earth is but one of countless bodies that travel round and round him, receiving and reflecting his light and heat in greater or less quantities according to their nearness to or distance from him. First of all, there are the eight large *planets,* of which our earth is fifth in size; next there are the smaller *planetoids,* or *asteroids,* which are counted in hundreds; lastly there are the myriads of *meteors,* which travel in swarms and are so small that they are not visible unless they come in contact with our atmosphere, whereupon they burst into flames and are seen as shooting stars. Besides all these there are the *comets*—"visitors from space," one astronomer calls them—some of which are "transients."

None of the members of the solar system moves about the sun in an exact circle, though all have regular orbits. When the distance of any one from the sun is stated, its mean distance is meant. A peculiar thing about the distance of the larger bodies, first shown to the astronomical world in 1722 by a German named Bode, may be seen in the following table:

	Tens of millions of miles from sun	Bode's numbers
Mercury	3.57	4
Venus	6.72	7
Earth	9.29	10
Planetoid Eros	*13.55*	
Mars	14.15	16
Planetoid Ceres	*27.66*	28
Jupiter	48.33	52
Saturn	88.60	100
Uranus	*178.19*	196
Neptune	279.16	388

Bode formed his series of numbers by adding 4 to each number in the series, 3, 6, 12, 24, 48, 96. In his day the planets and planetoids italicized in the above table were unknown, but it was seen that the distances of six known planets corresponded very closely to his numbers. In 1781 Uranus was discovered, and was found to correspond fairly well with another number in the table. Astronomers began to take more interest in Bode's Law, and their search for a planet to correspond to the missing number 28 resulted in the discovery of Ceres and other asteroids. Whether or not the law is a mere coincidence or represents a true law of the universe scientists do not yet know.

Related Subjects. More about the solar system will be found under ASTRONOMY, and certain theories as to its origin in the article NEBULAR HYPOTHESIS. The reader may also consult the following articles:

Asteroids	Planet (with list)
Comet	Planetoid
Copernicus	Satellite
Gravitation	Sun
Meteors	

SOLDERS, *sod'erz,* alloys used to join surfaces or edges of certain metals, by fusion at the point of contact. To be effective, a solder must melt more easily than the metal to which it is applied. Solders are of two classes—hard and soft. Hard solders are usually prepared by combining in each case the metal to be soldered with some others. Solder for gold, for example, is prepared from gold and silver, or from gold and copper, or from a mixture of the three metals. Silver solder consists of equal parts of silver and brass, with the addition of a little zinc. Soft solders are prepared from varying proportions of tin and lead, bismuth being sometimes added. Hard solders can be drawn out into threads and hammered into sheets. That is, they are both ductile and malleable. Soft solders melt the more easily but are too brittle to bear hammering. Before surfaces are soldered they must be bright and clean and free from oxide.

SOLDIERS' HOMES, homes for disabled or aged soldiers of the armies of the United States. These homes afford provision for the comfort and well-being of soldiers who have lost their health in the country's service. Candidates for entrance into homes must be provided with an honorable discharge from service and a medical certificate, which must show a state of health which unfits him for ordinary labor. Inmates are subject to the Articles of War as if still serving in the army, and they

receive free medical attendance, clothing, food and shelter. A pensioner on entering a home may assign his pension to parent, wife or child, or part of the pension may be drawn, the remainder being kept in trust by the treasurer of the home.

The first soldiers' home was founded in the District of Columbia, by act of Congress, in 1851. This Home is for soldiers of the regular army only. National homes for volunteer soldiers, supported by the Federal government, are situated in the following cities:

Dayton, O.	Leavenworth, Kan.
Milwaukee, Wis.	Santa Monica, Cal.
Togus, Me.	Marion, Ind.
Danville, Ill.	Jackson City, Tenn.
Hampton, Va.	Hot Springs, S. D.

State homes for soldiers of the volunteer armies are in the cities named below:

Yountville, Cal.	Tilton, N. H.
Monte Vista, Colo.	Kearney and Vineland, N. J.
Norton Heights, Conn.	Bath and Oxford, N. Y.
Boise, Ida.	Lisbon, N. D.
Quincy, Ill.	Sandusky, Ohio.
Lafayette, Ind.	Rosebury, Ore.
Marshalltown, Iowa.	Erie, Pa.
Fort Dodge, Kan.	Bristol, R. I.
Chelsea, Mass.	Hot Springs, S. D.
Grand Rapids, Mich.	Bennington, Vt.
Minnehaha, Minn.	Orting and Port Orchard, Wash.
Saint James, Mo.	Waupaca, Wis.
Columbus Falls, Mont.	Cheyenne, Wyo.
Grand Island and Milford, Neb.	

SOLE, a family of flatfish having the characteristic twisted cranium and both eyes on the right side of the body. (See article FLATFISH.) The eyes are small and set close together, the mouth is crooked, and the body a flattened oval, something like the sole of the human foot in shape. These fish are found in warm seas near shore. The common American sole, known locally as the *hogchoker,* inhabits the eastern coast of North America. It has a brownish body marked with black bands. This sole is valueless as a food fish, but the European species is much prized because its flesh is firm and white and of good flavor. The European sole grows from ten to twenty inches in length and averages about a pound in weight. A species of flounder that inhabits the Pacific coast waters is known in California as a sole. This species is an excellent food fish.

SOL'ID, a term used in mathematics to define a magnitude with the three dimensions of length, breadth and thickness. Any particular solid takes its name from the shape of its bounding surfaces, as cube, sphere, etc.

In physics, a body is said to be *solid, liquid* or *gaseous* according to the power of its molecules to resist forces tending to change its shape.

Related Subjects. The following articles in these volumes discuss various mathematical solids or present important phases of this subject:

Cone	Mensuration
Cube	Prism
Cubic Measure	Pyramid
Cylinder	Sphere
Geometry	

SOLITAIRE, *sol i tair',* the collective name of many games of cards to be played by one person. The object of the games in all variations is to arrange the cards in suits, and build up or down in regular sequence, while following certain rules. The player's interest lies in the extent of his success in working out the various combinations. Under the name of *Patience* these games have been known and played for centuries, though few ancient writers give details of the various plays. In some variations of solitaire the exercise of skill and judgment is necessary, but in most they depend entirely on the element of luck. A great number of solitaire games are described in manuals of card games.

Consult Hoyle's *Games.*

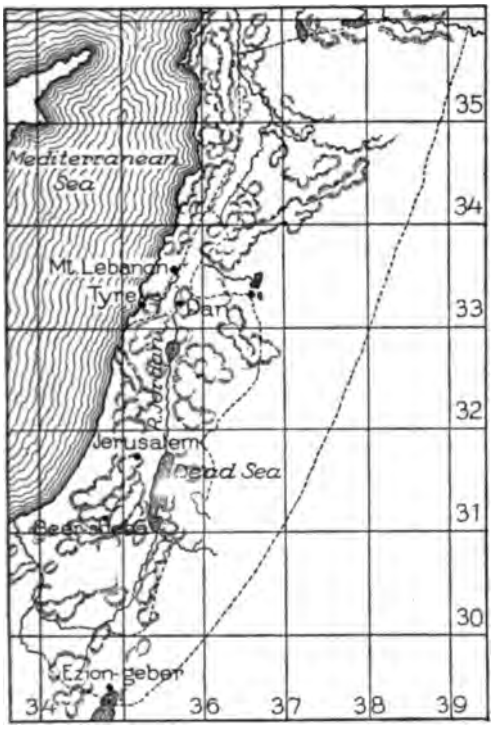
SOL'OMON, the third king of Israel and the wisest man of his age, was the second son of David and Bathsheba. His name means *peaceful* and it was given him because of a prophecy which foretold his birth: "His name shall be Solomon, and I will give peace and quietness unto Israel in his day" (*I Chronicles* XXII, 9). Solomon's reign extended from about 990 to 931 B.C. He was born in Jerusalem, but nothing is known about his boyhood. Many suppose that the prophet Nathan was his teacher. However this may be, the knowledge and ability which he showed when he became king would lead to the belief that he had received the best training possible for the high office he was to fill.

When King David was about to die Solomon's brother Adonijah attempted to make himself king; but David had promised Bathsheba that Solomon should succeed him as king, so Bathsheba and Nathan told David of Adonijah's attempt. David then told Nathan to have Solomon ride to Gibeon and there be anointed king by Zadok, the priest. When this was done, Adonijah and his followers feared for their lives, and "each man went his own way," leaving Solomon in peaceful pos-

session of the kingdom; but, according to the custom of his time, Solomon caused the leading men who opposed him to be slain, one by one.

Solomon's Dream. Solomon is supposed to have been about twenty years of age when he became king. He was a zealous worshiper of Jehovah, and began his duties by offering sacrifices and giving God thanks for the great favors conferred upon him. In the night God appeared to Solomon in a dream and said, "Ask what I shall give thee;" and Solomon said:

"O, Lord, my God, thou hast made thy servant King instead of David, my father: and I am but a little child; I know not how to go out or come in. And thy servant is in the midst of thy people which thou hast chosen, a great people, that cannot be numbered nor counted for multitude. Give thy servant therefore an understanding heart to judge thy people, that I may discern between good and evil, for who is able to judge this, thy great people?"



THE KINGDOM OF SOLOMON
The dotted line farthest east represents the eastern boundary of the territory directly influenced by his reign.

The record states that "the speech pleased the Lord," and Solomon was promised not only wisdom, but also wealth and honor. The promise was literally fulfilled, for Solomon was recognized as the wisest and wealthiest king of his age.

Building the Temple and Palace. According to the account in *I Chronicles,* David, before his death, gave Solomon the plans and full directions for building the Temple, for which he had gathered together most of the material. Solomon formed an alliance with Hiram, king of Tyre, by whom he was furnished with skilled workmen and cedar. The structure was begun in the fourth year of his reign, and seven years were required for its completion. Though small and plain compared with many of the cathedrals of modern times, the Temple was considered to be one of the most wonderful buildings of its time. Its completion established Jerusalem as the center of worship for the nation, as well as the center of government.

Solomon also built for himself a palace upon grounds adjoining those of the Temple. This required thirteen years for its completion, and it was not finished until the twentieth year of his reign.

Extending Commerce. Solomon placed fleets of ships on the Red Sea and on the Mediterranean. These vessels were manned by Phoenician sailors, because the Israelites were not acquainted with the art of navigation. The fleets of Solomon are supposed to have sailed southward as far as the southern part of Africa and westward as far as Spain. Some authorities believe that they sailed eastward as far as India, but there is no positive information concerning the extent of any of these voyages. We do know, however, that Solomon extended the commerce of his kingdom to all surrounding nations, and that his ships, for that age, made long voyages. As a result of his trade with so many peoples he gained great wealth, which he expended in maintaining his army and court.

The Splendor of the King. Soon after he became king, Solomon made an alliance with Pharaoh, king of Egypt, and married his daughter, bringing her to Jerusalem. His palace was one of the most magnificent structures of the time. His throne was of ivory covered with gold. All the kingdoms over which he ruled "brought presents and served Solomon all the days of his life." "And the king made silver to be in Jerusalem as stones, and cedars made he to be as sycamore trees that are in the lowland, for abundance." We read also that he had 40,000 stalls of horses for his chariots and 12,000 horsemen. In addition to these were several hundred officials of state and attendants who were maintained in and about his palace.

Solomon's Wisdom. Solomon was more than a judge and lawgiver to his people. He studied into the secrets of nature and learned many facts that previous to his time had not been observed. From the proverbs which he spoke we know that he had a good knowledge of plants and animals, also that he was a student of human nature. His proverbs are guides to life, and for three thousand years they have influenced men. The Bible tells us that "he

THE DIVISION OF HIS KINGDOM

spoke three thousand proverbs, and his songs were a thousand and five." Only one song, *The Song of Solomon,* and the proverbs found in the book of *Proverbs* are all that remain of his sayings and writings, but these are enough to place him among the wisest of men. After communing with him, the Queen of Sheba, who visited him with all the pomp and splendor of an Eastern monarch, exclaimed, "The half was not told me; thy wisdom and prosperity exceedeth the fame which I heard. Happy are thy men, happy are these thy servants, which stand continually before thee, and that hear thy wisdom."

His Decline. Contrary to the Hebrew ideals, Solomon established a harem, and made alliances with women of the surrounding heathen nations. In time, to appease these women, he erected altars to their gods in and about Jerusalem. This weakened his influence over the Israelites and caused dissension in his court. Moreover, the extravagance of the court caused a heavy burden of taxation, under which the people had become restive, so during the last years of his reign the seeds of dissension, which bore fruit in the division of the kingdom soon after his death, were gradually sown. He reigned forty years and was succeeded by his son, Rehoboam.

Estimate of His Character. In his temperament and tastes Solomon was the opposite of his father David. He preferred the pursuits of peace to those of war, and under him the Hebrew nation enjoyed a longer period of universal peace and prosperity than at any other time in its history. An eminent authority, Richard G. Moulton, has aptly characterized these two great kings:

> What David achieves, Solomon carries further. If David founded a kingdom, Solomon extended this to an empire. If David had the honor of ordering the service of Jehovah, it was reserved for his son to lay the art and riches of Tyre under contribution to crown the Divine service with the Temple. David is the center of Hebrew poetry; Solomon is the founder of its wisdom.

Consult Caldecott's *Solomon's Temple: Its History and Structure;* Harris's *The Odes and Psalms of Solomon.*

Related Subjects. The reader is referred to the following articles in these volumes:

David	Solomon's Song
Jerusalem	Temple

SOLOMON ISLANDS, an archipelago in the Western Pacific Ocean about 120 miles west of the Bismarck Archipelago, with an area of 17,000 square miles. The principal islands are Bougainville, Choiseul, New Georgia, Ysabel, Malaita, Guadalcanar and San Christobal. The larger islands are of volcanic origin, the smaller of coral formation. There are several active volcanoes, and earthquakes are frequent. The climate is hot and unhealthful. Great Britain controls the greater part of the archipelago. Many of the islands are covered with dense forests containing ebony and sandalwood; vegetable ivory, copra and pearl shell are exported in large quantities. The population is estimated at 176,000, of whom only 500 are

Europeans, who are there for commercial reasons. The Solomon Islands were discovered by Alvaro Mendaña, the Spanish navigator, in 1567. See map, with article OCEANIA.

SOLOMON'S SONG, SONG OF SONGS, or CANTICLES, one of the books of the Old Testament, a dramatic poem written in celebration of wedded love. In its present form the original assignment of parts to characters is difficult to restore. There are two current interpretations, in the first of which King Solomon, disguised as a shepherd, woos a country maiden and takes her finally to his court, where they are married in great splendor, returning afterward to her rural home for a honeymoon. In the second, the maiden, though surrounded by all the allurements of king and court, remains true to an actual shepherd lover, to whom she at last returns. The culmination of either plot is found in the lines (VIII, 6-7):

> For love is strong as death;
> Jealousy is cruel as Sheol.
> . . . . . .
> Many waters cannot quench love,
> Neither can the floods drown it.

In Jewish theology, *Solomon's Song* is considered as an allegory, picturing the close relationship between God and Israel. Christian commentators regard it as symbolizing the union of Christ and the Church.

SO'LON (about 639-559 B.C.), an Athenian statesman, one of the most famous lawgivers of all time, whose name is yet a synonym for wisdom. He was by class a noble, and was well educated, but was obliged to support himself by commercial ventures. His first public service consisted in an appeal to the Athenians which led to the regaining of the island of Salamis, long in the hands of the Megarians. About 594 B.C. he was elected archon, and promptly instituted legal and governmental measures which have made his name famous.

Political and economic reforms were sadly needed in Athens. Most of the money had accumulated in the hands of a comparative few; living was high, and the small farmers had been compelled in many instances to mortgage their land, while the free laborers had sold themselves into slavery to obtain the means of subsistence. By a sweeping ordinance Solon annulled all these debts and mortgages and provided that in the future no man should pledge his own person as security in borrowing money. He changed the system of coinage in such a way as to give immediate relief to many, and forbade the exportation of most articles.

His constitutional reforms consisted in a redivision of citizens into four classes, according to income, members of all classes to hold membership in the assembly and in the public law courts. In that offices were open only to members of the three higher classes, and the archonship only to the highest class, the reforms of Solon left the constitution of Athens oligarchic, but the granting to every citizen of legal and judicial privileges was a long step toward democracy.

According to tradition, Solon pledged the Athenians to keep his laws for ten years, and left the state for that length of time. Civil strife broke out almost immediately, however, and before the death of Solon Athens had come into the control of the tyrant Pisistratus.

Related Subjects. The reader is referred to the following articles in these volumes:

Archon	Pisistratus
Oligarchy	Seven Wise Men

SOLSTICE, *sol'stis,* a term used in astronomy to describe the point in the ecliptic at the greatest distance from the equator, either north in summer or south in winter. The word is derived from the Latin *solstitium,* meaning a *standing still of the sun.* In the spring the sun crosses the equator in the ecliptic to the north of the equator on June 21. The sun apparently stands still or holds the same position for several days before starting southward. It reaches the southern winter solstice about December 22, when the northern day is shortest, and the days then begin to lengthen as the sun turns towards the north and continues thus until June 21, when the northern longest day of the year occurs.

Related Subjects. The reader is referred for related information to the following articles in these volumes:

Ecliptic	Sun
Equinox	Tropics

SOLUTION, *so lu'shun.* When the particles of a solid, such as sugar, or of a gas, as carbon dioxide, or of a liquid, as alcohol, mingle with the particles of a fluid so completely that a uniform liquid results, a *solution* is formed. The resulting liquid is not an example of chemical, but physical, change, for a new chemical compound is not formed. In case of a sugar solution, for example, the substance may be reconverted into sugar by evaporating the water. When any solvent has dissolved as much of a given substance as it can, the solution is said to be *saturated.* At the same time it may not be saturated with respect to another substance,

for a saturated salt solution will dissolve sugar crystals. When a solid changes to a liquid form heat is absorbed, and it is on this principle that freezing mixtures are based. When pounded ice and salt are mixed together and packed about an ice cream receptacle, they change to liquid form and in so doing absorb heat from the contents of the can.

At a given temperature the solubility of a particular solid in a given liquid never varies, but its solubility varies with different solvents. At ordinary temperatures table salt dissolves about three times as freely in water as in alcohol; grease cannot be dissolved in water, but it can be in gasoline. Some very hard substances are slightly soluble. Flint glass, for example, used in making cut glass utensils, dissolves somewhat in aqua ammonia. For this reason the housewife should never clean her cut glass in water containing ammonia. When a gas dissolves in a liquid there is a release of heat and a rise of temperature.

SOL'WAY FIRTH, an inlet of the Irish Sea, between Scotland and Cumberland County, England. It is about thirty-five miles long, and its width increases irregularly till it reaches twenty miles. Solway Firth is particularly noted for its spring tide, which drives in as a tidal bore six feet high at the rate of ten miles an hour. The waters are shallow and stocked with fish, particularly salmon. There are several fisheries on its banks, and some minor ports, such as Whitehaven, Harrington and Kirkcudbright.

SOLYMAN II, *sol'i man* (1494-1566), a sultan of Turkey, known as SOLYMAN THE MAGNIFICENT, under whom the Turkish Empire reached the very height of its power. The name is also given by some authorities as SULEIMAN.

The country at his accession was prosperous, the army and the provinces were in excellent shape, and Solyman showed himself well able to make the best of these advantages. In his own country he is known as the lawgiver, for he did much to improve the administration of laws and incidently to better the condition of his Christian subjects; but it is chiefly for his conquests that he is remembered in European history.

He captured Belgrade and pressed on into Hungary, winning in 1526 a famous victory at Mohacs. Twice he threatened Vienna, and though compelled to retreat, could never be forced to give up his hold on Hungary. He took Rhodes from the Knights of Malta, partially subjugated Persia, and showed his ambition to take part in European political affairs by making a treaty of alliance with Francis I of France. Literature had the benefit of his encouragement, and he proved himself generally an enlightened ruler.

SOMALILAND, *so mah' le land,* or **SOMALI,** a region in the eastern part of Africa consisting of English, French, Italian and Abyssinian dependencies. Somaliland forms the peninsula which lies between the Gulf of Aden and the Indian Ocean (see colored map, opposite page 81). The boundaries of the Abyssinian territory, which is in the interior and lies west of the other three dependencies, have not been exactly defined.

French Somaliland, known officially as the *Somali Coast,* lies to the north at the head of the Gulf of Aden, between British Somaliland and Eritrea. It has an area of 5,790 square miles. There are several ports, the chief of which is Jibuti, with a population of about 16,500. This town is the seat of government of the colony, and is connected with Abyssinia by a railway. In normal years over 350 steam vessels clear its harbor annually. Somali Coast is not well developed industrially, but there is a considerable export trade in coffee, hides, skins, gold and ivory. Overseas trade is chiefly with France and Great Britain. The country is hilly along the coast, but the interior is an elevated plateau.

SOMALILAND
(F) French; (B) British; (I) Italian.

British Somaliland is known officially as *Somaliland Protectorate.* It borders on the Gulf of Aden, and on the land side adjoins Somali Coast and Abyssinian and Italian territory. The protectorate is about 68,000 square miles in area, and has a population estimated to be 360,000. Nearly all of the inhabitants are Mohammedans, and with the exception of those who dwell in the coast towns, they are wandering herdsmen. Berbera, the largest town and the seat of government, has about 30,000 inhabitants during the trading season. Exports include skins, cattle and sheep, ostrich feathers and ivory. The region is for the most part a

sandy plain, with occasional mountains of granite and basalt.

Italian Somaliland is a long, narrow strip of country extending along the Indian Ocean from British Somaliland to the Juba River. The dependency is called officially the *Colony and Protectorates of Italian Somaliland*. The area is 139,430 square miles and the population about 400,000. Along the coast the land is flat, but the inland regions are hilly. Hides and skins are exported in large quantities, and live stock, cotton and gums are also shipped. Mogadiscio and Obbia are the chief ports. The region has few forests, and is for the most part arid. See PROTECTORATE. J.S.C.

SOMERVILLE, *sum'er vil,* MASS., in Middlesex County, is a residential city two miles northwest of Boston, adjoining Medford and Cambridge. It is on the Mystic River and on the Boston & Maine and the Boston & Albany railroads and electric interurban lines. The population of 77,236 in 1910 had increased to 87,039 in 1916 (Federal estimate). The area exceeds four square miles. The city is built upon hills whose strategic position caused them to be identified with important events of the War of Independence. A circular, slate-stone Powder House, built in 1703, stands on Quarry Hill in the western part of the city, in what is now a public park; fortifications were built upon different hills. Paul Revere on his famous ride in 1775 passed through the city over the street now called Broadway. The prominent modern features of the city are the city hall, state armory, Carnegie Library, hospitals and home for the aged. Slaughtering, pork packing and manufacturing are the leading industries. Somerville was settled about 1631 and was a part of Charlestown until it was separately incorporated in 1842. A city charter was granted in 1871. F.O'B.

SOMME, *sohm,* a small river in the northern part of France, in the vicinity of which was fought, in 1916, one of the greatest battles of all time. The Somme rises in the department of Aisne and follows a general westerly course of 140 miles to its estuary on the English Channel. Through this estuary ocean steamers ascend the river to Saint Valery. A canal runs parallel with the Somme from Saint Valery past Amiens to Saint Quentin, and from that point there is communication by canal with the Oise and the Scheldt.

Battle of the Somme. This engagement represents the great Anglo-French offensive against the Germans during the summer of 1916. It was directed by General Sir Douglas Haig, commander-in-chief of the British, and the French commander, Marshal Joffre. The British forces occupied the front to the north of the river, while the French held a mile of the front on the northern bank, and a ten-mile front south of the river. The first infantry charge was made on the morning of July 1, but this drive had been preceded by an intense artillery bombardment of the enemy's intrenchments and fortifications. After two weeks of furious fighting the British had advanced three miles on a ten-mile front and had captured 10,000 prisoners; the French, in the same period, had advanced their line six miles and had captured 12,235 men. Then followed furious German counter-attacks, but by the first of August twenty-four square miles of territory had been conquered by the British.

Through August there was a lull in the fighting, during which preparations were made for a renewal of the drive. The second offensive began on September 3 and continued without abatement until interrupted by heavy rainstorms. The allies made their last attacks in November. It was during the second phase of the drive that the British first used "tanks," heavy motor trucks encased in steel armor plate and carrying big machine guns.

In summing up the results of the Battle of the Somme, General Haig claimed that it was a success because (1) it had drawn the enemy from Verdun; (2) it had held large forces of Germans on the western front and enabled Russia to win a victory in the east; (3) it had inflicted heavy losses on the German army. In all, 120 square miles of territory were conquered by the allies. Statements of the losses on both sides were conflicting, but a fairly accurate estimate gave the allied loss as 675,000, and the German as high as 700,000 in killed, wounded and prisoners. See article WAR OF THE NATIONS. B.M.W.

SOMNAMBULISM, *som nam'bu liz'm,* or **SLEEP'WALKING,** a curious condition in which a sleeper acts his dreams. Everybody dreams occasionally during sleep, and a great many people talk aloud in their dreams, but the person who translates his dreams into motion is comparatively rare. There are, of course, many degrees of such activity, from simply getting out of bed and walking about, to performing complicated and difficult muscular feats. Tests have been made which prove that, as a rule, a somnambulist cannot hear ordinary sounds; that, whether his eyes are

closed, or half closed, or wide open, he does not see; that he can neither taste nor smell. But he is usually endowed with marvelous muscular control. Sleepwalkers have been known to write letters, to paint pictures, or to perform other familiar tasks; they have also been known to climb steep roofs and to walk along the ridges, to follow narrow and dangerous paths, and to accomplish other feats which they could not perform if they were conscious. When a somnambulist awakes, if he remembers anything at all, he remembers it merely as a dream.

Somnambulism occurs most often in highly sensitive or neurotic individuals, and seems to be aggravated by ill health and sometimes by heavy eating. Relief is secured by building up the general health of the patient and by guarding him against nervous strain and shock. A sleepwalker should not be awakened suddenly.

Consult Janet's *The Mental State of Hystericals;* Tuke's *Sleepwalking and Hypnotism.*

SOM'NUS, in Greek mythology, the god of sleep, and the son of Erebus and Nox. He dwelt in a great cave in a remote and quiet valley with his brother Mors, the god of death. Shadowy forms kept watch about the mouth of the cave, and shook great bunches of poppies, while they enjoined silence upon all who came near. In one of the darkened inner rooms of the cave drowsy Somnus lay upon his couch, clothed in black garments studded with stars. On his head was a crown of poppies, and in his hand a goblet of poppy juice. Morpheus, his prime minister, supported his head and protected him during his slumbers. Pleasant Dreams hovered about his couch, and hideous Nightmares lurked in the darkened corners. Sometimes the Dreams were sent out of this valley by way of glittering ivory gates to the earth, where they warned mortals of coming misfortunes.

SONNET, *sahn'et,* a form of poem, a branch of the lyric (see LYRIC POETRY), which is limited to fourteen lines, rhymed according to a very definite plan. This verse form originated in Italy, and was given its classic form by Petrarch. He arranged the lines of a sonnet in two groups, an eight-line group known as the *octave* and a six-line group known as the *sestet.* There are but two rhymes in the octave, the usual arrangement being *abba, abba,* while the sestet may have either two or three rhymes which may be placed according to various schemes. The sestet may not, however, be broken into couplets.

The sonnet was introduced into England about the middle of the sixteenth century by the Earl of Surrey and was immensely popular with the writers of the Elizabethan age, Spenser and Shakespeare having each produced numerous examples. They varied the rhyme scheme, however, from the Petrarchan original, and Shakespeare's method has been adopted by many of his successors. Instead of two quatrains and a sestet, he made of the sonnet three quatrains and a couplet, rhymed usually *abab, cdcd, efef, gg.*

As it is so brief, the sonnet must be limited to one idea or emotion. Among the romance peoples any type of subject, light or serious, may be treated in a sonnet, but in English sonnets usually none but the graver thoughts and sentiments find place. The very greatest of English poets have particularly delighted in this form of poem, seeming to realize that by its means they could attain a gemlike perfection impossible otherwise; and Shakespeare, Milton, Wordsworth and Keats are the great names in the history of the sonnet in England. Mrs. Browning's *Sonnets from the Portuguese* have a high place among love poems, and many of Rossetti's sonnets are exquisite. Perhaps the best-known sonnet in English is Milton's *On His Own Blindness;* it is given below, both for its own worth and to show the construction of a sonnet:

When I consider how my light is spent
Ere half my days, in this dark world and wide,
And that one talent which is death to hide
Lodged with me useless, though my soul more bent
To serve therewith my Maker, and present
My true account, lest he, returning, chide;
"Doth God exact day-labor, light denied?"
I fondly ask. But Patience, to prevent
That murmur, soon replies, "God doth not need
Either man's work, or his own gifts. Who best
Bear his mild yoke, they serve him best. His state
Is kingly; thousands at his bidding speed,
And post o'er land and ocean without rest;
They also serve who only stand and wait."

Consult Quiller-Couch's *English Sonnets, with Introduction and Notes;* Hall Caine's *Sonnets of Three Centuries.*

SONS OF LIB'ERTY, the name adopted by an organization among the American colonists which actively opposed the Stamp Act. It was not a single society with a central government, but a group of patriotic associations which sprang up simultaneously in the different colonies, those of New York and Connecticut becoming strongest. Through committees of correspondence the work of the different so-

cieties was coördinated. The chief mission of the Sons of Liberty was accomplished when the Stamp Act was repealed in 1766, but they still opposed the importation of goods from England and later favored independence.

Originally they were of necessity secret societies, but later worked openly and had to do with many of the early movements toward separation, such as the calling of the Continental Congress. During the latter part of the War of Secession the Knights of the Golden Circle were sometimes called Sons of Liberty, the earlier name having been discredited. See STAMP ACT; REVOLUTIONARY WAR IN AMERICA.

SONS OF VET'ERANS, an American patriotic society, organized on September 29, 1879, in Philadelphia, Pa., for a purpose similar to that of the Grand Army of the Republic (which see). The society is composed of lineal male descendants, over eighteen years of age, of honorably discharged soldiers, sailors, or marines who served in the War of Secession. There are now about 1,215 camps and 56,000 members, distributed among twenty-seven state divisions, the national body or general society constituting the commandery-in-chief. A bronze bar, inscribed with the words *Filii Veteranorum,* with a pendant of red, white and blue ribbon, attached to a medallion with the letters "S. V.," is the insignia of the society.

The Sons of Veterans auxiliary is an association of women organized to assist needy veterans and to give aid in the proper observance of Memorial Day.

SOOT, a fine, black substance deposited by smoke. It results from the imperfect combustion of fuel, such as wood, coal or oil, and contains much carbon and ammonium salts. The large amount of nitrogen in the latter makes soot an excellent fertilizer, especially for cereals, grasses and carrots. The soot nearest the fire is often a shining brown powder containing dried tar; it is used as a pigment under the name of *bistre.* The blacker soot farther up the chimney, especially that from oil or resin, is the pigment *lampblack.* Soot adheres to anything with which it comes in contact; hence smoke blowing through a city deposits its soot upon the buildings in its path and makes them dingy. In London (which see) the damage from soot is estimated at twenty-five million dollars a year. In the worst cases about three per cent of the coal burned is converted into soot. See SMOKE.

SOPHISTS, *sof'ists,* meaning *men of wisdom,* was the name given to wandering instructors in Greece in the fifth and fourth centuries B. C., previous to the rise of the schools of philosophy under Plato and Aristotle. They taught culture, disputation, rhetoric and politics, taking fees from their pupils, and for a hundred years were almost the only schoolmasters of the Greeks. They had no uniform philosophy, but were, in general, skeptical and indifferent to truth, emphasizing effect rather than accuracy. Their influence on literature and oratory was beneficial, but their insincere method of reasoning had a mischievous effect on conduct. They were despised by Socrates and his school, who taunted them with "selling wisdom" and with taking pride in "making the worse appear the better."

Consult Adams' *The Religious Teachers of Greece.*

SOPHOCLES, *sof'o kleez* (about 496-406 B. C.), a Greek dramatist, born at Colonus, a suburb of Athens. At the age of twenty-eight he submitted his first play, *Triptolemus,* in competition with Aeschylus and won first prize. He served in political offices as a patriot rather than as a politician, in 440 B. C. was chosen one of the board of generals in the war against the aristocratic party of Samos, was later general in the Peloponnesian War, and a member of the committee that reported on the proposed oligarchichal constitution for the state. In his old age he held a minor priesthood, and at his death was given heroic honors.

SOPHOCLES
From a bust in the Capitoline Museum, Rome.

In talents and virtues, he was constantly offered as an ideal to the Athenian youth, and his whole life was an unusual combination of grace, versatility and success. He won prizes in youth, manhood and old age; and for a period of thirty-two years earned the first prize about twenty times and never fell to the third place.

Changes in the Drama. His dramas, of which seven out of the total number of 120 are extant (with fragments of others), represent

marked development in dramatic technique. He introduced a third actor, thus enlarging the scope of the action; increased the chorus from twelve to fifteen members and subordinated it to the main plot, thus making it essentially the ideal interpreter of the action, and completed each play in itself, instead of grouping three about a central theme as Aeschylus and other dramatists had done. His style is characterized by elegance and beauty; his characters are Hellenic in their calm reserve and human in the distinctness with which they are presented.

Dramas That Are Extant. His *Antigone* is a problem play, revealing the tragedy of a conflict between the law of the individual conscience and the dictates of political authority. In the *Oedipus Tyrannus* he makes use of what has been called Sophoclean, or dramatic, irony, and shows how the hero Oedipus unknowingly but inevitably fulfils the oracle which has decreed that he should live in incestuous marriage with his mother after slaying his father. The other plays that now exist complete are *Ajax, Electra, Trachiniae, Philoctetes* and *Oedipus at Colonus.* In all there is a pervading sublime, religious reverence, and his conception of Fate is no longer the traditional one of making it a blind, external power, but something, instead, that results inevitably from character and circumstance. Sophocles has rank with Aeschylus and Euripides as the foremost dramatist in the golden age of Pericles. M.R.T.

Consult Wright's *Short History of Greek Literature;* Murray's *History of Ancient Greek Literature.*

SORBONNE, *sohr bon',* a famous institution of learning in Paris, the outgrowth of a medieval college of theology. It has belonged to the city of Paris since the middle of the nineteenth century. The modern Sorbonne is housed in one of the finest university buildings in the world, dating from 1889 and known as *La Nouvelle Sorbonne* ("the New Sorbonne"). The institution maintains faculties of science and literature and has splendidly equipped laboratories, lecture rooms and libraries. The faculties of science and letters of the University of Paris have their headquarters in the Sorbonne building. At the outbreak of the War of the Nations about 5,000 students were associated with the institution, and it had about one hundred professorships.

The old Sorbonne was founded in the thirteenth century by Robert of Sorbon, and was originally a hall of residence and study for poor theological students. In the course of time the institution became one of the strongest theological schools on the Continent. In the seventeenth century its buildings were reconstructed by Richelieu, who built a magnificent chapel for its students. Among the changes that occurred when the institution was reorganized after the French Revolution was the abolishment of the faculty of theology.

SOREL, *so rel',* a city of Quebec, in Richelieu County. It is on the right bank of the Richelieu River at its junction with the Saint Lawrence, forty-two miles northeast of Montreal and forty miles southwest of Three Rivers. It is served by the Quebec, Montreal & Southern Railway, and is a port of call for Saint Lawrence boats. Sorel is above all else a shipbuilding center, and its deep-water harbor makes it an ideal shipyard. Population in 1911, 8,420; in 1916, about 8,800.

Sorel has considerable water commerce in coal, pulp wood, ore and grain. In addition to ships its chief manufactured products are agricultural and other machinery, clothing, native wines and war munitions. The water works were purchased by the city in 1872, and the gas works in 1881. The city was incorporated in 1889. A convent school for girls, Saint Bernard College (a $200,000 building), the Dominion government's building and the Richelieu Market (1882) are worthy of special mention. The convent and a number of adjacent buildings were damaged by fire on November 9, 1915.

SORGHUM, *sawr'gum,* a group of plants belonging to the grass family, one class of which contains a sweet sap from which syrup is made. The syrup-yielding plants are known as *saccharine* sorghums, and the others as *nonsaccharine.* Kafir corn and broom corn, both of which are described under their titles in these volumes, are the best-known varieties of the nonsaccharine class. The saccharine varieties are cultivated for their sap, as forage plants and as packing for silos. About 15,000,000 gallons of sorghum syrup are produced each year in the United States, but recent experiments of the Department of Agriculture indicate that the sap does not make good sugar. Sorghums are tall, earless plants, bearing heads of seeds.

SORORITY, *so rahr'i ti,* from the Greek word for *sister,* is the name applied to a Greek-letter society for women students in colleges and universities, corresponding to the *fraternity,* for men. In all essential respects the aims and organization are identical with those of the fraternity. See FRATERNITY; COLLEGE.

Development. As the idea of the higher education for women became popular, women began entering the universities to share the educational advantages of their brothers. It was only natural that they should come to feel the same need of sympathetic companionship and a definite outlet for their social instincts as the men had felt and met through the organization of their fraternities. The latter furnished a ready-made model after which the women could pattern.

The first secret society for women was the *Adelphian,* which in 1851 was organized at Wesleyan College, Macon, Georgia. Although this did not begin existence under a Greek name, it followed the fraternity idea in its other features, and in 1905 the name itself was changed to Alpha Delta Phi sorority. Kappa Alpha Theta is usually spoken of as the first sorority, since it was the first to use the Greek letters; it was founded at DePauw University in 1870. In the same year Kappa Kappa Gamma was started at Monmouth College, in Illinois.

Several of the honorary fraternities admit women as well as men to membership. Among these are Phi Beta Kappa, the oldest of the fraternities; Sigma Xi, similar to Phi Beta Kappa, but confined to students following scientific lines; Phi Kappa Phi and Alpha Omega Alpha.

Consult Baird's *American College Fraternities;* Stevens' *Cyclopedia of Fraternities.*

SORREL, *sahr'el,* the name applied to several plants belonging to the buckwheat family, whose juicy leaves and stems contain oxalic acid and have a sour taste. In Europe, particularly in France, the plant is cultivated extensively and is used in soups, salads and for greens. Several varieties to which the name is applied are *mountain, Indian, switch, water* and *sheep* sorrel, the latter a weed which grows in barren soil and spreads rapidly. Indian sorrel, grown in tropical countries, is used in making jellies and refreshing drinks. The common American species is a low-growing plant with three-parted leaves on long stems, and bears small white, pink or yellow flowers. Almost all of the sorrels are useful for allaying fever and as a remedy for scurvy. The name is derived from an old French word meaning *sour.*

SORREL TREE, or **SOUR'WOOD,** a beautiful tree of the heath family, growing plentifully in the woods of the Southern United States and also found as far north as Pennsylvania, Indiana and Ohio. The names refer to the taste of the leaves and twigs, which hunters and woodsmen sometimes chew to quench their thirst, *sorrel* being derived from an Old French word meaning *sour.* The tree often reaches a height of sixty feet, and has reddish-gray bark and smooth, oblong leaves. In summer it bears graceful clusters of small, white, bell-shaped flowers, which are followed by little, downy capsules. In spring the foliage is bronze-green, but in autumn it turns a brilliant scarlet. The wood is used for turning articles such as tool handles and bearings for machinery, while the leaves furnish a black dye.

SOTHERN, Edward Hugh (1859-), an American actor, born at New Orleans, La. His father, who was a player well known both in America and Great Britain, was opposed to his child following the same profession, and therefore took the boy to England at the age of five and began to train him in the fine arts, especially painting. In 1879, however, Edward refused to continue art work, and in September commenced his theatrical career in New York. He then played unimportant characters in Boston, and in 1881 toured America as an actor of comic parts with John McCullough. After a brief tour of England he again joined the McCullough company.

A period of struggle and poverty followed, and Sothern thought at times of abandoning the stage. But in 1884 his future began to look brighter when he became leading man in such popular dramas as Sardou's *Scrap of Paper* and Howard's *One of Our Girls.* Three years later he took the most important rôle in *The Highest Bidder,* an old comedy found among his father's papers. Sothern's work was heartily praised by the critics, and early in 1888 Daniel Frohman, the New York theater manager, engaged him for a long term of years as the leading man in the Frohman Stock Company. In that position he made notable successes of such dramas as Belasco's *Chumley; The Prisoner of Zenda,* adapted from Anthony Hope's novel, and Justin McCarthy's *If I Were King.* In 1900 he began his acting of Shakespearean tragedies, and soon associated Julia Marlowe with him in productions which for years set the American standard for such plays. He married Miss Marlowe in 1911. In 1916 appeared his autobiography, *The Melancholy Tale of "Me;"* it is a complete presentation of the actor's personality and career.

SOUND. If you touch a gong while it is sounding you can easily feel that it is vibrating, and if you press against it to stop the vibrations you bring the sound to a sudden end.

The to-and-fro movement of the gong is the cause of what you hear. As the sides move outward they compress the air in all directions, and as they swing back they allow the air to expand; each particle of air presses against the particles beyond it, then draws back, and so the atmosphere about the gong is formed into a series of globular shells alternately of compressing and of expanding air. When these reach the air in your ear the changes of pressure on your eardrum send the sensation of sound to your brain.

How Sounds Differ. Since the surges of air against the eardrum are the cause of sound, it is plain that whether a noise is loud or soft, high pitched or low, pleasant or unpleasant, must depend upon the characters of the sound waves and of the individual ear.

Loudness. If you put your feet down gently when you walk, you move quietly; if you stamp, a loud noise results. The greater the force you exert, the stronger the compression which the resulting vibrations produce, and the more intense the effect upon your ear. The tramp of soldiers marching is louder than the noise from one person's feet because the simultaneous waves from sources close together combine their force. But sometimes two sounds result in no sound, for if the compression from one meets an equal expansion from another the waves at that point cease. Thus, if you turn a tuning fork slowly around near your ear you will find four positions in which you cannot hear it unless you hold something between one of the prongs and your ear.

If you hear four trumpets blown one hundred yards away, the sound seems to you about as

RIPPLES ON WAVES

As waves enlarge in circles from the point where disturbance occurs, so do sound waves travel from the exciting cause. (See illustration on next page.)

loud as that from one trumpet fifty yards away, for when the one source of waves is twice as far from you as is the other, the spherical surface of a wave from the first is four times as great as the surface of one from the second, and it contains four times as many particles to share the energy of the sound. The scientific statement of this law is that *the intensity of a sound varies inversely as the square of the distance from its source.*

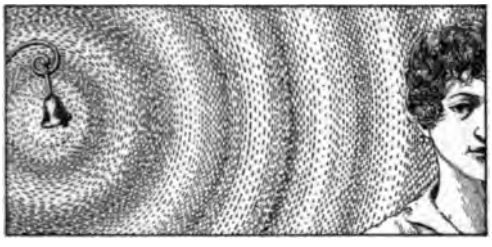
Most of us have tried the experiment of holding a watch between the teeth or pressing it against the forehead. At each vibration caused by the ticking, a wave of compression and expansion travels through the bones of the head just as it would through the air. In fact, the denser the object, the better, as a rule, will it transmit sounds. The reason will be plain to anyone who has played with pool balls; if half a dozen balls are placed in a row, all touching, a slight tap at one end will move the ball at the other end, but if the row is formed with space between the balls the first one must be hit quite hard in order to affect the last. The denser a substance the closer together are its particles of matter, and a sound will therefore travel better through steel or wood or even through water than through air, but will not progress at all in a vacuum.

Why is it, then, that the walls of a house soften the noises of the street? The reason is that when sound waves traveling in one medium meet the surface of another they are partly reflected, just as light is mirrored by a transparent pane of glass. Nature has taken advantage of this law in giving rabbits and other animals ears which they can hold erect to gather in a greater volume of sound; each wave impulse that strikes the wall of the ear at an angle is reflected inward at an equal angle, and so reaches the eardrum. Sound reflection is also responsible for echoes.

High Tones and Low. The rapidity with which an object vibrates is what determines the *pitch* of the sound given out. Thus a soprano, to sing high *C*, must send out four waves from her vocal organs in the time that a contralto singing middle *C* gives out one. The actual number of vibrations for middle *C*, whether sounded by human vocal chords, piano strings or wind instruments, is 256 per second. The ear takes note of sounds containing as many as 30,000 or even 40,000 vibrations a second, but is unaffected by fewer than 30.

The conditions which regulate the rate of vibration of any object are nearly all known, and our knowledge of them is utilized in making and in tuning musical instruments. Thus the low strings on a mandolin are thicker than the high strings, for to double the weight of a string halves its number of vibrations. To raise the pitch of a string you tighten it, doubling the number of vibrations if you quad-

ruple the tension, and to play a high note you shorten the string with your finger, doubling the number of vibrations if you halve the length. The same laws govern other stringed instruments and the drum. The pitch of wind instruments depends on their length, and on



HOW SOUND WAVES SPREAD

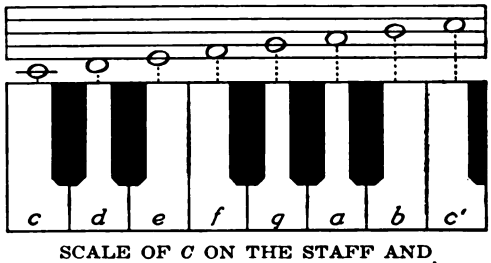
If sound waves could be seen they would appear as an ever-widening circle, moving from the exciting cause. Though unseen, they are as real as a widening circle of ripples on water. If the exciting cause be violent, as when a cannon is fired, the force of the waves of sound may destroy the eardrum.

whether or not they are open or closed at the ends; the reasons for this will be made clear by reference to the diagram in the article ORGAN, after a study of the explanation below of the length of sound waves.

Noise or Music. If we leave out of consideration the differences in personal likes and dislikes, the only distinction between musical and unmusical sounds is that the former have regular, the latter irregular, vibrations. A confusion of sounds makes *noise*, for the various sound waves mingle and cause the ear to receive a jumble of sensations. If you stand on a hill above a city, or high up in a skyscraper, you find many of the sounds of the city, which below are so disagreeable, to be distinct musical tones; but, as in music, notes which separately are pleasant may produce discord if sounded together.

Discord in music seems to be due to what are known as *beats*. If you strike any two adjacent piano keys simultaneously, you can distinctly hear throbs in the sound. The waves from the two notes start at the same instant, but because the upper string vibrates faster than the lower its first push against the air is completed sooner and it starts to draw back while the other is still moving outward. It starts its second push still farther ahead and continues to gain until after a time an instant comes when the expansive force of one exactly balances the contractive force of the other and there is silence. The next instant the one wave has gained on the other again, and with the two once more moving in the same direction, the sound surges out with doubled intensity. Since a beat occurs only as often as one wire has made a complete vibration more than the other, there will be as many beats per second as the difference between the number of vibrations each makes. Notes which sound about thirty beats per second make the most disagreeable combination; above and below that number the unpleasantness gradually decreases, and seventy or more beats per second are not noticeable. When notes differing more than seventy vibrations produce discord, as do *C* and the *B* above it, there are beats with or between the *overtones*. Piano tuners always listen for beats.

Quality of Sound. *Overtones* are the notes produced when an object vibrates not only as a whole but also in parts. If you rest a small piece of paper on the center of a violin string it will not be thrown off while the string is vibrating, for while the left half moves up the right half moves down and the center is motionless. Thus, while the whole string is producing the *fundamental* note, each half is producing a note an octave higher, called the



SCALE OF *C* ON THE STAFF AND KEYBOARD

first overtone. By vibrating in thirds also, the string sounds another overtone, in fourths another, and so on. Overtones are very important in music, for, as proved by Helmholtz, their number and strength determine quality of tone.

Sympathetic Vibration. If you hold down the loud pedal of a piano, so that all of the wires are free to vibrate, and sing a note into the wires, they will send back the same tone with so much realism that they seem to be mocking you. This is because the waves from the fundamental and overtones of your voice set in motion the wires which are of the proper length, tension and thickness to sound them. Sometimes a certain note on a piano will cause window panes to rattle, and sometimes glass is broken by vibrations set up by music. On the other hand it is because of sympathetic vibration that an old house gives to music such a mellow sound.

Speed of Sound. Nearly every one has tried the experiment of counting between a stroke of lightning and the peal of thunder which follows, to learn how far away the flash occurred. If you count in seconds and divide the result by five, you will have an approximately correct idea of the number of miles, for sound travels through the air about a fifth of a mile in a second, and light covers 186,000 miles in a second, which for practical purposes is an instantaneous rate. The temperature of the air affects the speed of sound; at the freezing point it is about 1,090 feet per second and increases about two feet for every degree Centigrade, or a little over one foot for every degree Fahrenheit.

When There's No Ear to Hear. A man on a hilltop sees a large tree fall half a mile away, but no other evidence of its fall reaches his senses. He sees a rushing cataract still farther away, but except for sight has no evidence of its existence. If he says the falling tree and the waterfall make no sound, is he right? If the sound waves of the air do not reach the ear, is there sound? Imagine a tree falling a hundred miles from a human being, or as far from one of the lower animals or any other form of animal life. Would it make a sound? Does sound issue from a telephone ringing in an empty house far from other buildings?

There are few livelier questions for discussion, but even scientists do not agree upon the answer. C.H.H.

Related Subjects. The following topics in these volumes may be consulted in connection with this article on sound:

Ear	Light
Echo	Music
Harmonics	

SOUND'ING, the process by which ocean depths are determined. In very early times attempts were made to find the depth of water for the purpose of aiding navigators, but it was not until the nineteenth century that instruments were invented which could be successfully used for deep-sea sounding. The introduction of submarine cables made necessary a detailed knowledge of the contour of the ocean bed and greatly stimulated efforts to perfect a satisfactory sounding machine. The simplest sounding device is the plummet, a lead shaped like a window weight, to one end of which a stout cord is attached. It is thrown into the water, and as it sinks it draws the cord with it, which, being marked in feet, shows the depth. See PLUMMET.

For deep-sea and scientific purposes the plummet is replaced by a diving rod, which is a hollow cylinder with valves at the top and bottom, opening upward. It is weighted with iron sinkers slightly conical in shape, with a cylindrical hole through which the diving rod easily passes, and these are so attached to the head of the rod that they become loose and slip off when it strikes the bottom. The hempen cord of the common plummet is replaced by a fine piano wire, which passes over a grooved wheel, and the depth is measured on the principle of a cyclometer. As the rod is hollow, it brings up a core of mud from the bottom. The valves which were open in the descent close and preserve the contents, while the sinkers remain behind and are lost.

SOURIS, *soo'ris,* a town in the southwestern corner of Manitoba. It is on the Souris River and on several branches of the Canadian Pacific Railway, twenty-four miles southwest of Brandon and 151 miles west of Winnipeg. The word *souris* is French for mouse, and was given to the town and the river because of the many muskrats in the river. Plum Creek, so called for the wild plums which grow on its banks, empties into the Souris River at this point. The town was founded in 1882. Population in 1911, 1,854; in 1916, 1,845.

Souris is a railway division point, and has Canadian Pacific repair shops. Among the largest manufacturing establishments are a flour mill, a furniture factory, and a foundry and machine shop. The shipment of grain raised in the surrounding agricultural district is an important industry, as is shown by the capacity (200,000 bushels) of the local elevators. The town owns and operates its waterworks and electric light and acetylene gas plants. The $50,000 postoffice, erected in 1912, and the $45,000 collegiate institute, are splendid stone structures.

SOURIS, a town in Kings County, in the northeast part of Prince Edward Island, on Colville Bay. It is on the Prince Edward Island Railway, sixty miles almost directly east of Charlottetown. Fishing, the leading industry, is mostly for lobsters, but considerable attention is given to cod, hake and haddock. Sawmills and planing mills, cheese box and motor boat factories are the only manufacturing establishments of importance. Population in 1911, 1,089; in 1916, about 1,500.

SOUSA, *soo'za,* JOHN PHILIP (1854-), an American composer and bandmaster, was born at Washington, D. C. He studied music

in that city, making a specialty of the violin, and at the age of seventeen was conductor of an orchestra. In 1880 he became leader of the United States Marine Corps Band and for twelve years maintained it among the greater musical organisations of the world. While in this work he began to compose marches, which were among the first to contain a large amount of syncopation, or "ragtime" rhythm. This form of music rapidly attained national popularity, and the Marine Band was probably in greater demand than any other organization of the kind in America.

JOHN PHILIP SOUSA

In 1892 he founded Sousa's Band, and during the next eight years directed it in practically every state and territory of the American nation, and in Canada. Between 1900 and 1905 he made four tours of Europe, and in 1910 and 1911 a tour of the world. Many honors were bestowed upon him abroad, among them the palms of the French Academy, the rank of Officer of Public Instruction by the French government and the Grand Diploma of Honor by the Academy of Hainaut, Belgium.

Sousa is one of the most prolific composers in musical history, and his marches are better known than the compositions of any other American musician. His band is by far the best in the United States. For these reasons it was especially fitting that he should be selected to organize bands at the Great Lakes Training Station, in Illinois, on Lake Michigan, after the entrance of the United States into the War of the Nations, in 1917. He was also made an officer in the United States navy, with the provisional rank of lieutenant. The Navy Department has officially adopted his collection, entitled *National, Patriotic and Typical Airs of All Countries.* Among his most popular marches are *The Washington Post, Under the Double Eagle, El Capitan, Liberty Bell, King Cotton* and *The Stars and Stripes Forever;* the last-named undoubtedly has been more popular than any other band or orchestra music of the twentieth century. His descriptive composition, or suites, such as *Last Days of Pompeii* and *The Chariot Race,* and his comic operas, such as *El Capitan* and *The Charlatan,* have also won unusual public favor. Sousa has done some interesting work in his novels, *The Fifth String* and *Pipetown Sandy,* and in his descriptive book, *Dwellers in the Western World.* R.D.M.

SOUTH AF'RICA, UNION OF. See UNION OF SOUTH AFRICA.

SOUTH AF'RICAN WAR (1899-1902), a struggle for supremacy in South Africa between the British government and two Boer republics—the South African (now the Transvaal) and Orange Free State. This war grew out of the jealousy and ill-will existing between the Boers, or Dutch settlers, and the foreigners, or *Uitlanders,* most of whom were British subjects. In 1884 gold was discovered in the Transvaal, and the large influx of Uitlanders to the district served greatly to disturb the placid Boers. The latter, who believed that the Uitlanders hated them and would seek to gain political control of the government, put forth every effort to check such a plan. Under the leadership of their president, Paul Kruger, they so modified the naturalization laws that in 1887 the term of residence necessary for securing citizenship was fixed at fifteen years. The foreigners protested against this and other restrictions as unjust, and in 1896 the opposition took concrete form in an armed uprising known as Jameson's Raid.

Negotiations between the British government and that of the South African Republic failed to secure a peaceful solution of the difficulty, and in October, 1899, war was declared, the Orange Free State joining with its sister republic against the British. At the outbreak of hostilities an army of 12,000 British troops was stationed in Natal and small detachments were posted at Kimberley, on the western frontier of Orange Free State, and on the Bechuanaland and Rhodesian borders. The Boers swarmed into Natal and shut up the British force at Ladysmith. The English troops under generals French and Gatacre checked the Boer advance into Cape Colony and Lord Methuen opened the way to Kimberley. The British then met with a series of discouraging reverses, but in January, 1900, reënforcements arrived under Lord Roberts, Lord Kitchener acting as his chief-of-staff.

A new campaign was immediately begun. On February 27, the Boer general, Cronje, surrendered to Lord Roberts at Paardeberg in Orange Free State, and the following day a

final and successful attempt raised the siege of Ladysmith, where for months the British troops had been suffering from disease and starvation. British advances were made in the northern part of Cape Colony, and on March 13 Lord Roberts entered Bloemfontein, the capital of Orange Free State, and the republic was proclaimed British territory.

After encountering the Boers under General Louis Botha on the Vet River, Lord Roberts crossed the Vaal and entered the city of Johannesburg on May 31. Five days later he took Pretoria, the capital of the South African Republic, and President Kruger fled to the Portuguese territory in the east. The British forces in Natal pushed north, driving the Boers before them, and united with Lord Roberts in a drive against General Botha, who was forced east into the mountains and surrendered on Portuguese territory, in September, 1900. The South African Republic was then declared British territory under the name of the Transvaal.

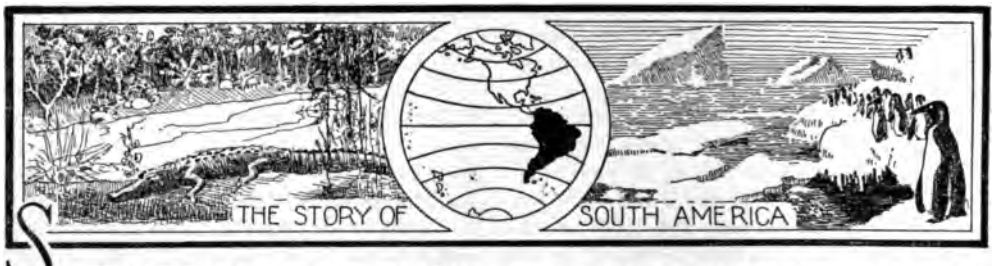
The rest of the struggle was characterized by guerrilla warfare. Lord Kitchener assumed command and began the task of pacifying the country. The daring action of small Boer detachments under generals Botha and De Wet lengthened the struggle, but the Boer leaders, one after another, were weeded out, and the final surrender was made on May 3, 1902. The total Boer enlistment did not exceed 75,000, while the British forces engaged numbered nearly 450,000 men.

The terms of peace provided that the Boers surrender all arms and munitions and swear loyalty to the new sovereign, Edward VII, and in return all prisoners outside of the colony were to be brought back to their homes and no proceedings were to be taken against burghers for action in connection with the war. Civil administration was to succeed the military government as soon as possible, and be followed by representative government; the Dutch language was to be allowed in courts of law and be taught in schools; a sum of $15,000,000 was to be granted to aid in the restoration of property. E.B.P.

Consult Maurice's *History of the War in South Africa;* De Wet's *Three Years' War.*

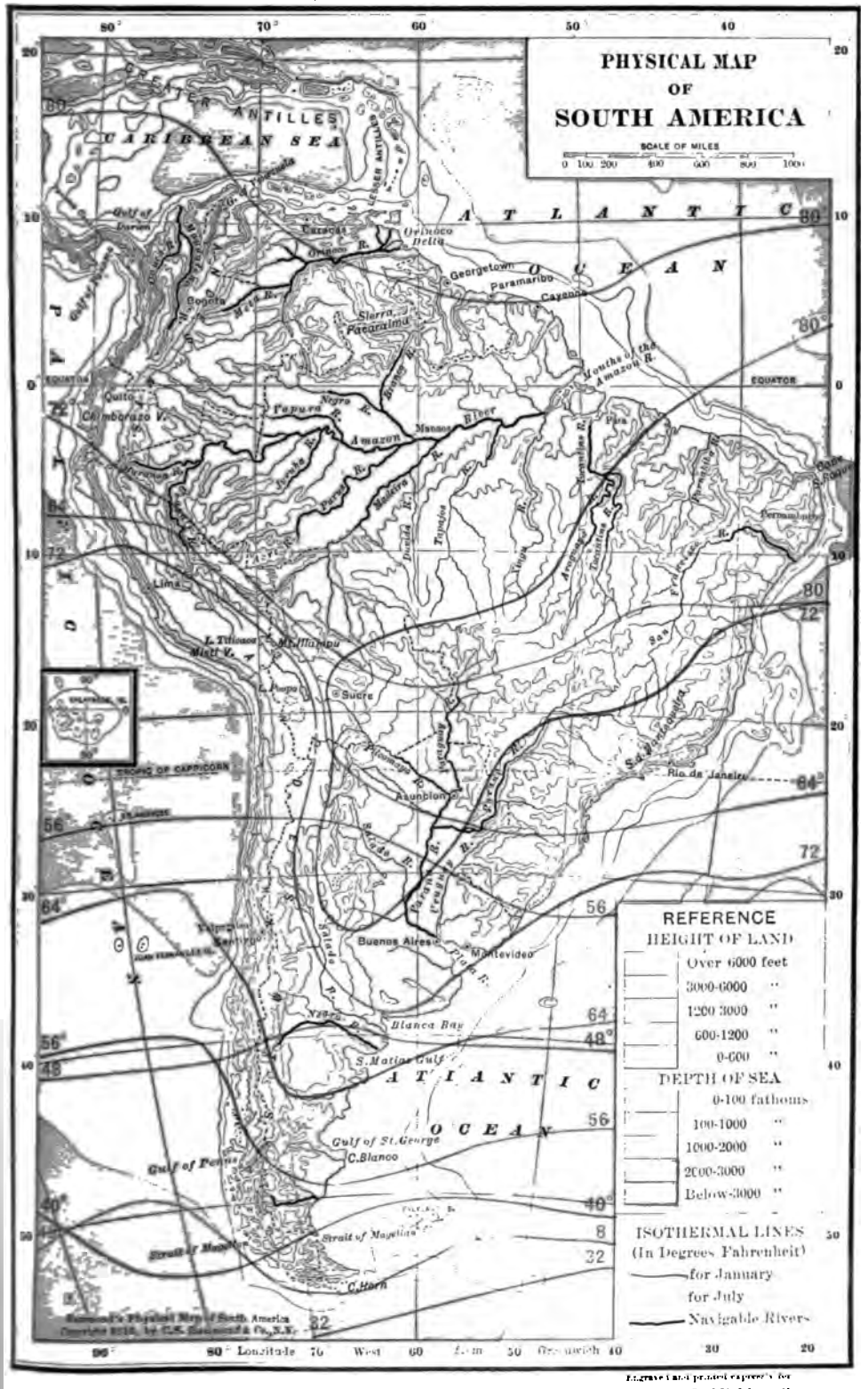
Related Subjects. Further information on various phases of this subject may be gained from the following articles in these volumes:

Boer	Ladysmith
Botha, Louis	Orange Free State
Jameson, Leander Starr	Rhodes, Cecil John
Kimberley	Roberts, Earl
Kitchener, Horatio Herbert, Earl	Transvaal
Kruger, Stephanus J. P.	Union of South Africa



SOUTH AMERICA, *a mer' i ka,* one of the great continents into which the earth is divided. With North America, with which it is connected by the narrow Isthmus of Panama, it forms what is known as the New World, a name adopted after the discovery of America in the fifteenth century. South America is only slightly smaller than North America, but it contains only about two-fifths as many inhabitants. The southern continent, including Mexico and Central America, is usually called *Latin America,* because its white inhabitants are chiefly of Spanish or Portuguese descent and speak one of these languages. Though North and South America have developed along different lines from an economic standpoint, it is significant that they are the world's greatest centers of democracy. In all their vast territory there is not one country governed as a monarchy.

Size and Location. Like North America, the southern continent is irregularly triangular in shape, with its widest extent in the north and the apex in the south. It has an area of 7,700,000 square miles, and occupies nearly one-seventh of the total land area of the globe. Its greatest length, from Punta Gallinas to Cape Horn, is 4,800 miles, and its greatest width, along the fifth degree of south latitude, is 3,300 miles. It extends about 1,000 mil· nearer to the South Pole than does Australia, which is considered the southernmost continent.



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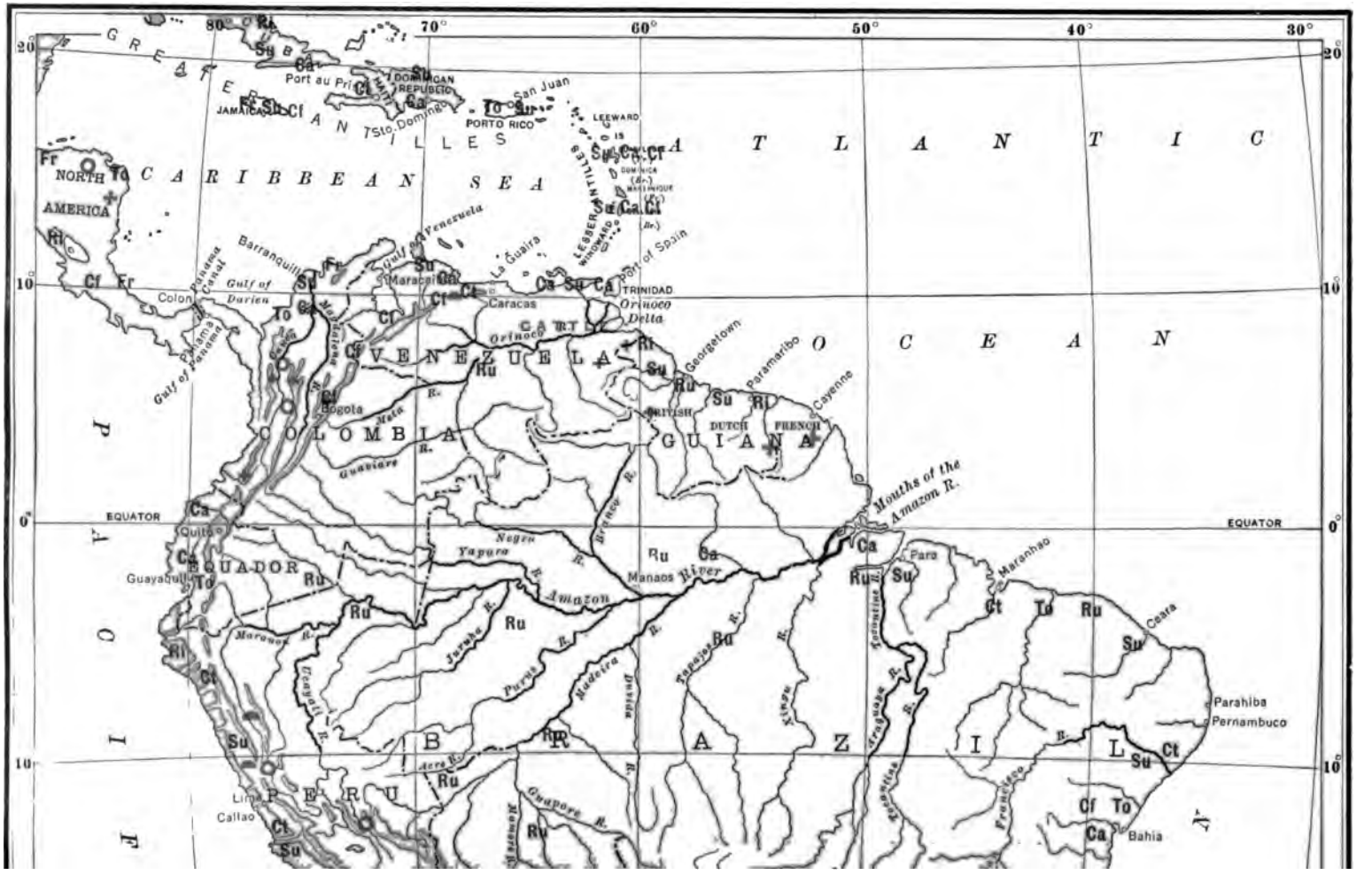
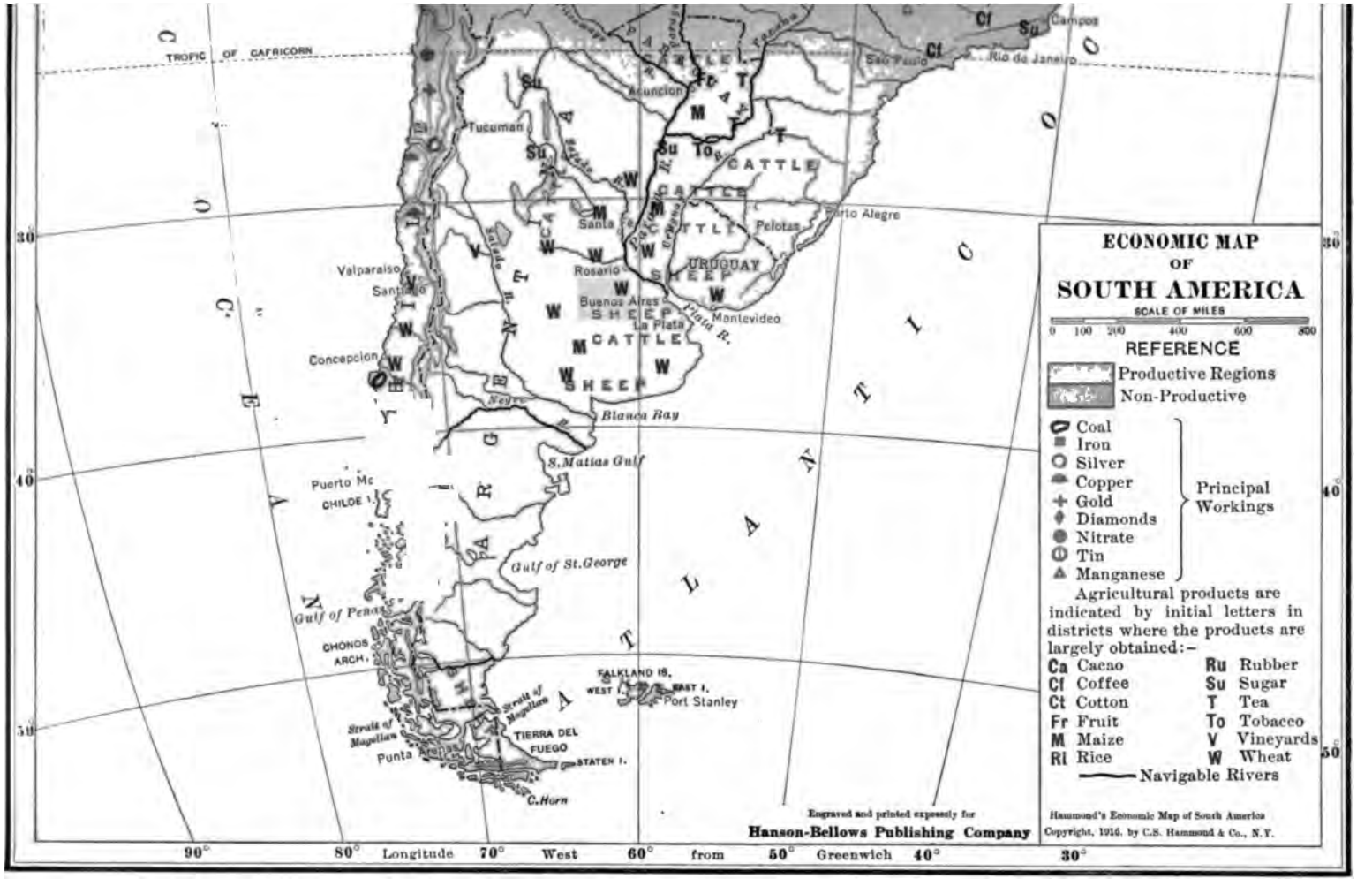


GREATER ANTILLES
CARIBBEAN SEA
ATLANTIC OCEAN
PACIFIC OCEAN
NORTH AMERICA
JAMAICA
Port au Prince
HAITI
DOMINICAN REPUBLIC
Sto. Domingo
San Juan
PORTO RICO
LEEWARD IS
LESSER ANTILLES
WINDWARD
DOMINICA (Br.)
MARTINIQUE (Fr.)
Port of Spain
TRINIDAD
Orinoco Delta
Barranquilla
Gulf of Venezuela
Maracaibo
La Guaira
Caracas
Colon
Panama Canal
Gulf of Darien
Gulf of Panama
Bogota
VENEZUELA
COLOMBIA
GUIANA
BRITISH
DUTCH
FRENCH
Georgetown
Paramaribo
Cayenne
Mouths of the Amazon R.
EQUATOR
Quito
Guayaquil
ECUADOR
Manaos
Amazon River
Para
Maranhao
Ceara
Parahiba
Pernambuco
Bahia
BRAZIL
PERU
Lima
Callao
Orinoco
Meta R.
Guaviare R.
Negro R.
Yapura R.
Branco R.
Jurua R.
Purus R.
Madeira R.
Tapajos R.
Xingu R.
Tocantins R.
Araguaya R.
Francisco R.
Guapore R.
Aere R.
Ucayali R.
Maranon R.
Mamore R.



ECONOMIC MAP OF SOUTH AMERICA

SCALE OF MILES
0 100 200 400 600 800

REFERENCE

Productive Regions
Non-Productive

Principal Workings:
- Coal
- Iron
- Silver
- Copper
- Gold
- Diamonds
- Nitrate
- Tin
- Manganese

Agricultural products are indicated by initial letters in districts where the products are largely obtained:–

Ca	Cacao	Ru	Rubber
Cf	Coffee	Su	Sugar
Ct	Cotton	T	Tea
Fr	Fruit	To	Tobacco
M	Maize	V	Vineyards
Ri	Rice	W	Wheat

Navigable Rivers

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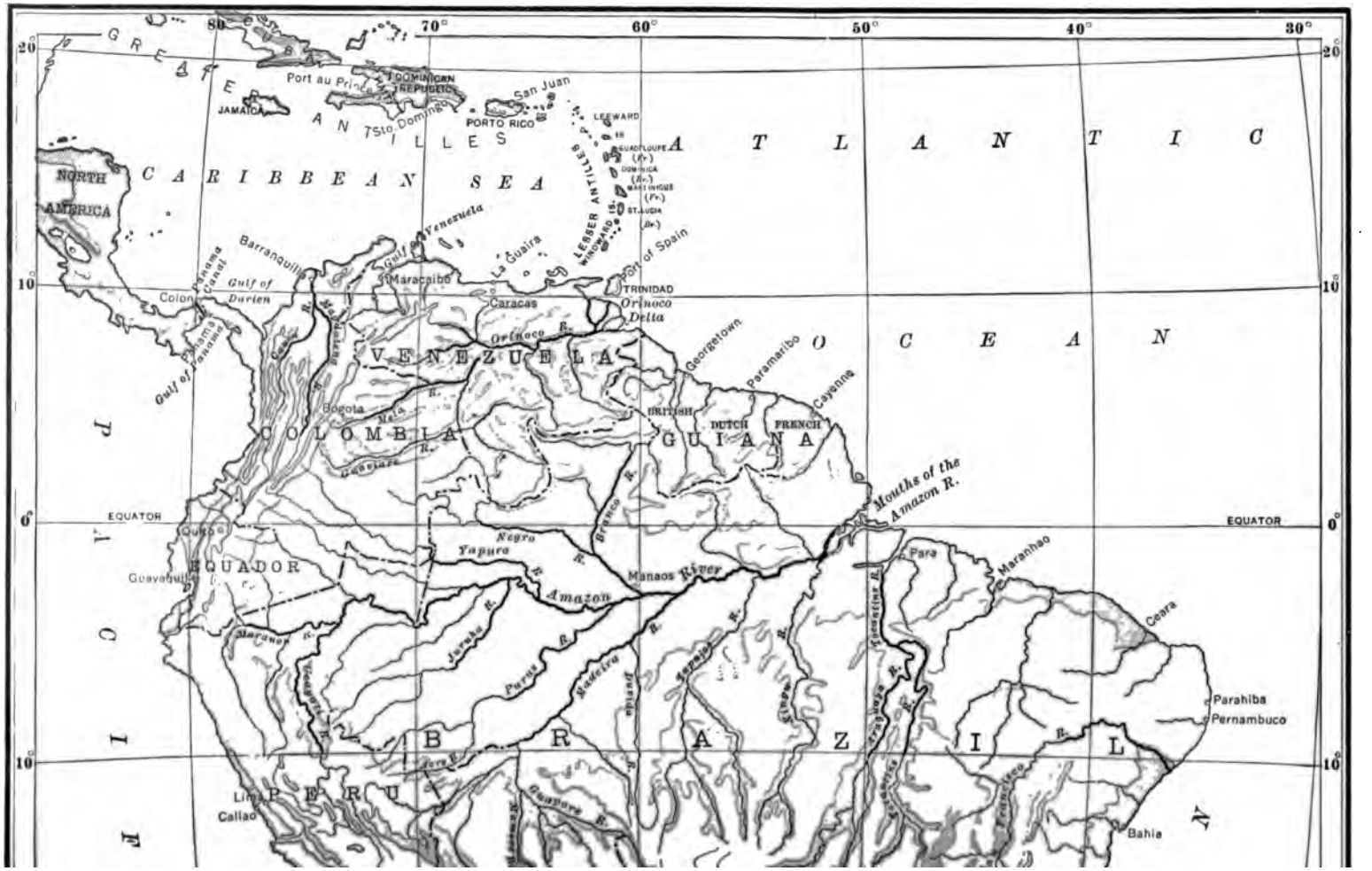
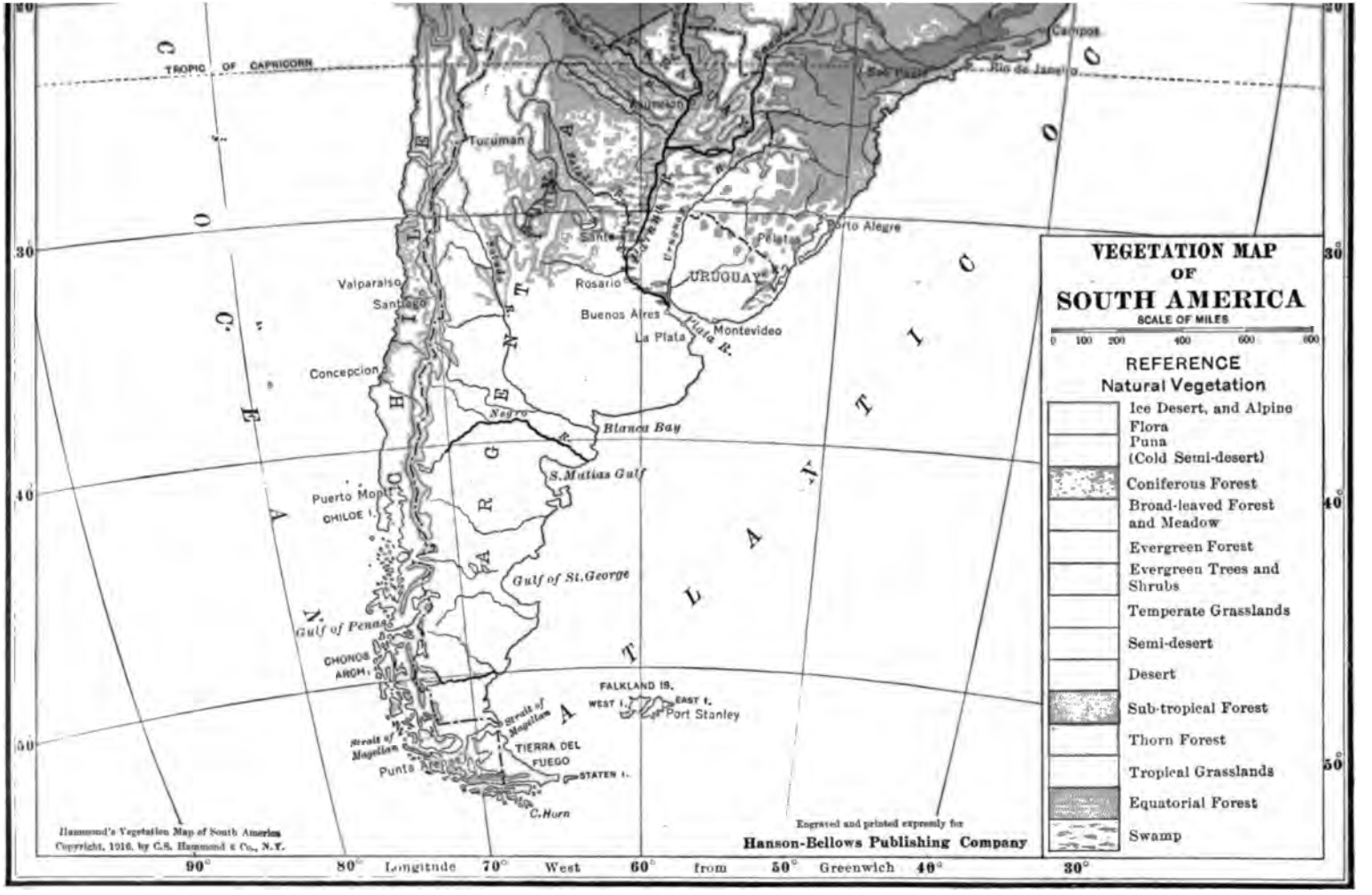


GREATER ANTILLES
CARIBBEAN SEA
ATLANTIC OCEAN
PACIFIC OCEAN
NORTH AMERICA
JAMAICA
Port au Prince
DOMINICAN REPUBLIC
Sto. Domingo
San Juan
PORTO RICO
LEEWARD IS.
GUADELOUPE (Fr.)
DOMINICA (Br.)
MARTINIQUE (Fr.)
ST. LUCIA (Br.)
LESSER ANTILLES
WINDWARD IS.
Port of Spain
TRINIDAD
Orinoco Delta
Barranquilla
Gulf of Venezuela
Maracaibo
La Guaira
Caracas
Colon
Panama Canal
Gulf of Darien
Gulf of Panama
Orinoco R.
VENEZUELA
Georgetown
Paramaribo
Cayenne
BRITISH
DUTCH
FRENCH
GUIANA
Bogota
COLOMBIA
Mouths of the Amazon R.
EQUATOR
Quito
Guayaquil
ECUADOR
Negro R.
Yapura R.
Branco R.
Manaos
Amazon River
Para
Maranhao
Ceara
Parahiba
Pernambuco
Bahia
Juruka R.
Purus R.
Madeira R.
Tocantins R.
Tapajos R.
Xingu R.
Araguaya R.
Maranon R.
Guayaquil R.
Acre R.
Guapore R.
Mamoré R.
Francisco R.
BRAZIL
PERU
Lima
Callao


VEGETATION MAP
OF
SOUTH AMERICA
SCALE OF MILES
0 100 200 400 600 800
REFERENCE
Natural Vegetation
Ice Desert, and Alpine Flora
Puna (Cold Semi-desert)
Coniferous Forest
Broad-leaved Forest and Meadow
Evergreen Forest
Evergreen Trees and Shrubs
Temperate Grasslands
Semi-desert
Desert
Sub-tropical Forest
Thorn Forest
Tropical Grasslands
Equatorial Forest
Swamp
TROPIC OF CAPRICORN
Campos
Rio de Janeiro
Tucuman
Asuncion
Santa
Rosario
Buenos Aires
La Plata
Montevideo
URUGUAY
Porto Alegre
Valparaiso
Santiago
Concepcion
Blanca Bay
S. Matias Gulf
Puerto Montt
CHILOE I.
Gulf of St. George
Gulf of Penas
CHONOS ARCH.
FALKLAND IS.
WEST I.
EAST I.
Port Stanley
Strait of Magellan
TIERRA DEL FUEGO
STATEN I.
Punta Arenas
C. Horn
Hammond's Vegetation Map of South America
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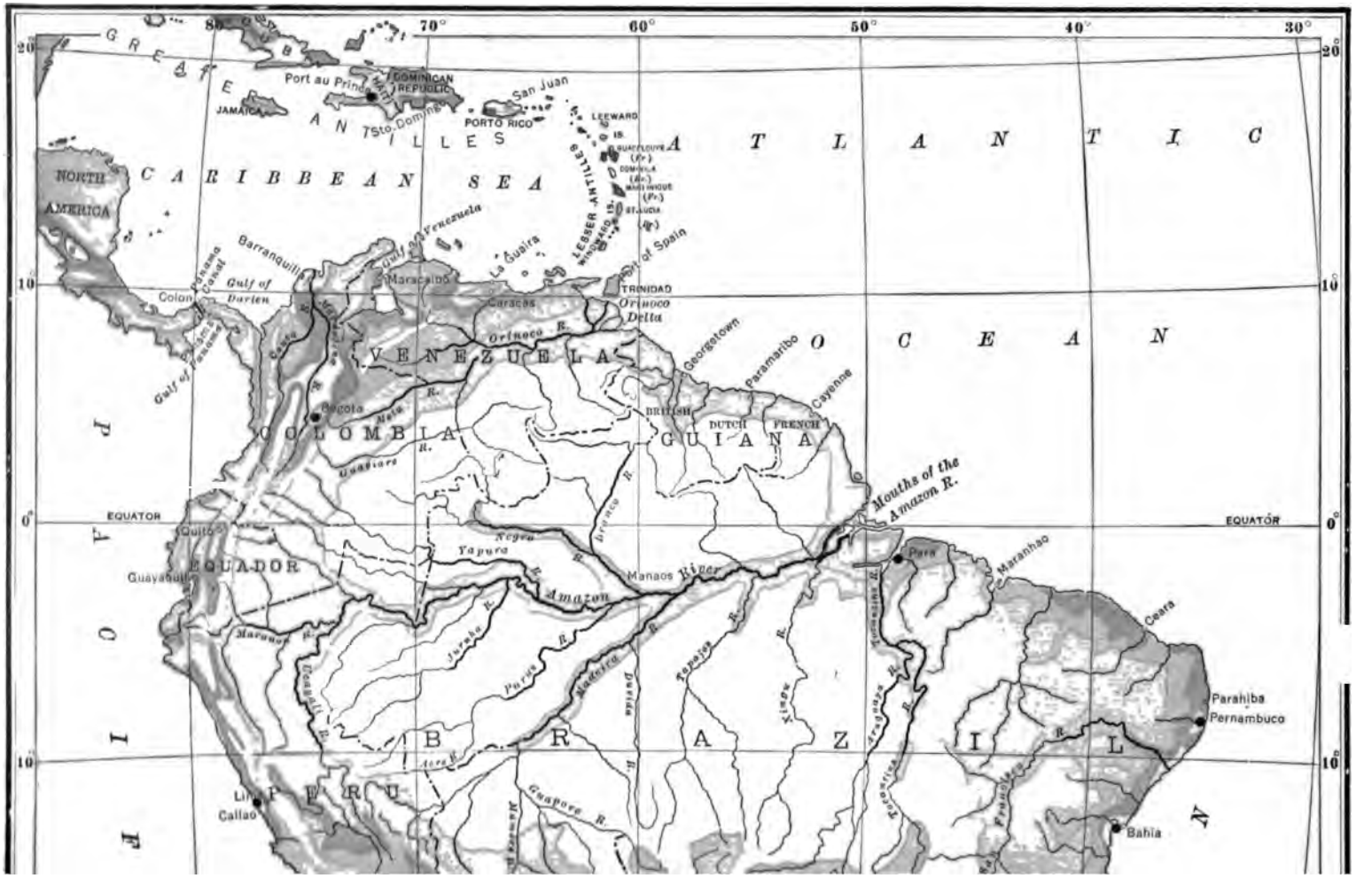
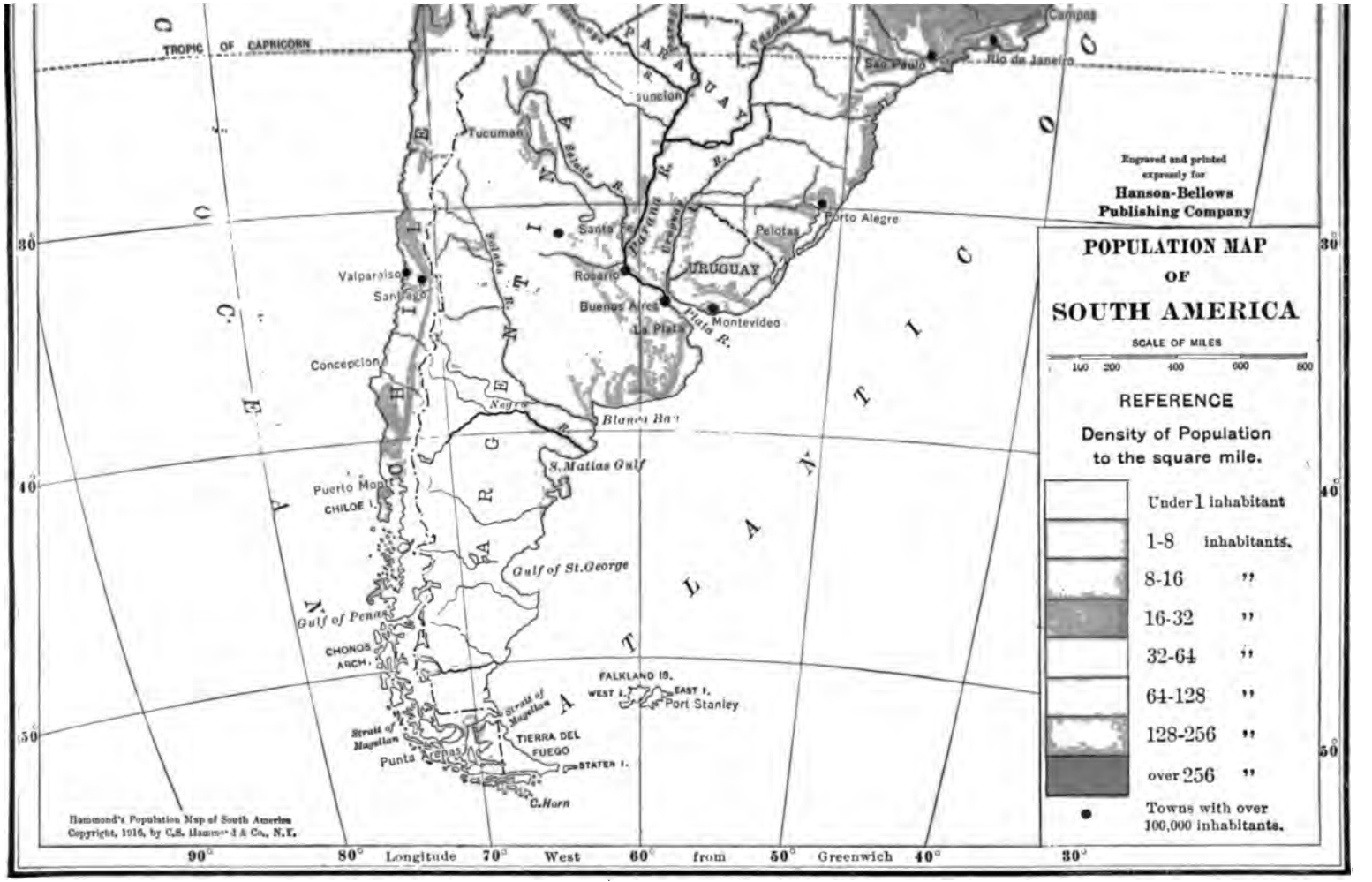
90° 80° Longitude 70° West 60° from 50° Greenwich 40° 30°



GREATER ANTILLES
CARIBBEAN SEA
ATLANTIC OCEAN
PACIFIC OCEAN
NORTH AMERICA
JAMAICA
Port au Prince
HAITI
DOMINICAN REPUBLIC
Sto. Domingo
San Juan
PORTO RICO
LEEWARD IS.
LESSER ANTILLES
WINDWARD IS.
ST. LUCIA
Port of Spain
TRINIDAD
Orinoco Delta
Barranquilla
Gulf of Venezuela
Maracaibo
La Guaira
Caracas
Colon
Panama Canal
Gulf of Darien
Gulf of Panama
Orinoco R.
VENEZUELA
Georgetown
Paramaribo
Cayenne
BRITISH
DUTCH
FRENCH
GUIANA
Bogota
COLOMBIA
Meta R.
Guaviare R.
Mouths of the Amazon R.
EQUATOR
Quito
EQUADOR
Guayaquil
Negro R.
Yapura R.
Manaos
Amazon River
Para
Maranhao
Ceara
Parahiba
Pernambuco
Bahia
Marañon R.
Ucayali R.
Jurua R.
Purus R.
Madeira R.
Tapajos R.
Xingu R.
Araguaya R.
Tocantins R.
Acre R.
Guapore R.
Lima
Callao
PERU
BRAZIL


TROPIC OF CAPRICORN
Campos
São Paulo
Rio de Janeiro
Asuncion
PARAGUAY
Tucuman
Santa Fé
Pelotas
Porto Alegre
Valparaiso
Santiago
Rosario
URUGUAY
Buenos Aires
La Plata
Montevideo
Concepcion
Blanca Bay
S. Matias Gulf
Puerto Montt
CHILOE I.
Gulf of St. George
Gulf of Penas
CHONOS ARCH.
FALKLAND IS.
WEST I.
EAST I.
Port Stanley
Straits of Magellan
TIERRA DEL FUEGO
STATEN I.
Punta Arenas
C. Horn
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POPULATION MAP OF
SOUTH AMERICA
SCALE OF MILES
100 200 400 600 800
REFERENCE
Density of Population to the square mile.
Under 1 inhabitant
1-8 inhabitants.
8-16 "
16-32 "
32-64 "
64-128 "
128-256 "
over 256 "
Towns with over 100,000 inhabitants.
Hammond's Population Map of South America
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90° 80° Longitude 70° West 60° from 50° Greenwich 40° 30°
30° 40° 50°

POLITICAL MAP
OF
SOUTH AMERICA
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SCALE OF MILES
0 100 200 400 600 800 1000
Hammond's Political Map of South America
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Railroads
Projected Railroads
Longitude West from Greenwich
CARIBBEAN SEA
ATLANTIC OCEAN
PACIFIC OCEAN
GREATER ANTILLES
LESSER ANTILLES
DOMINICAN REPUBLIC
PORTO RICO
JAMAICA
CEN. AMERICA
VENEZUELA
COLOMBIA
ECUADOR
PERU
BOLIVIA
PARAGUAY
URUGUAY
BRAZIL
BRITISH GUIANA
DUTCH GUIANA
FRENCH GUIANA
EQUATOR
TROPIC OF CAPRICORN
GALAPAGOS Is.
Caracas
Bogota
Quito
Lima
La Paz
Santiago
Buenos Aires
Montevideo
Asuncion
Rio de Janeiro
Sao Paulo
Amazon R.
Orinoco R.
Parana R.
Magdalena R.
Rio Grande do Sul
Port Stanley
Strait of Magellan
Cape Horn
Mt. Darwin
Mt. Aconcagua
Lake Titicaca
Gulf of Panama
Gulf of Venezuela
Gulf of Guayaquil
Gulf of Penas
Gulf of St. George
Blanca Bay
S. Matias Gulf
C. Corrientes
C. Orange
C. Tres Puntas
C. S. Roque
C. S. Francisco
Mouths of the Amazon R.
Falkland Is. (Br.)
Tierra del Fuego

The People. South America's 55,000,000 inhabitants represent a number of races. There are, first, the descendants of the native Indians, who inhabited that continent when the white man discovered it. The natives were divided into numerous tribes, speaking different but related languages and having various degrees of civilization. The Spaniards and the Portuguese who came here married Indian women, and this intermarrying produced a race of half-breeds, or *mestizos*. By far the greater proportion of the inhabitants of South America belong to this race of mixed blood. Later on, negroes from Africa were brought as slaves, and these by intermarriage contributed yet another strain of blood to the population. As a result of the intermingling of these various races there is no color prejudice in South America. The race problem, as between white and negro, which is a cause of friction in North America, does not exist in the southern continent. Of late years large numbers of Italians and Spaniards have come to the continent, settling particularly in Argentina. A number of Germans, Englishmen and citizens of the United States are located in the large towns. The Germans are most numerous, at least 500,000 being colonized in Brazil.

Coast Line and Islands. With the exception of the southern portion of the western coast, which is indented by numerous fiords and is bordered by islands, the coast line of South America is remarkably regular. In this respect South America resembles Africa, while North America resembles Europe. The large indentations are the Gulf of Darien on the north; the mouth of the Amazon on the northeast; and Bahia, or All Saints, Bay, the Bay of Rio de Janeiro, the mouth of the Rio de la Plata, Blanca Bay, the Gulf of San Matias and the Gulf of Saint George on the southeast. The only important indentation on the Pacific coast is the Gulf of Guayaquil, which indents the coast of Ecuador.

There are few islands belonging to the continent. Those worthy of mention are Trinidad, off the northern coast; Tierra del Fuego, separated from the mainland by the Strait of Magellan; the Falkland Islands, east of the southern extremity of the continent, and the Galapagos Islands, situated at the equator, west of Ecuador.

Physical Features of South America

Plains and Mountains. Looking at a physical map of the continent, one finds that there are several points of resemblance between its physical structure and that of North America. The most striking feature, as in North America, is the great mountain system that extends along the western coast, forming, as it were, the backbone of the continent. This mountain system is known as the Andean Cordillera, or Andes. Next to the Himalayas in Asia it is the highest mountain range in the world, and its loftiest peak, Aconcagua, is about 23,080 feet above the sea. Between the Andes and the Pacific Ocean there stretches for a distance of 4,000 miles a narrow plain, which has an average breadth of forty miles and a maximum breadth never exceeding a hundred miles. To the east of the Andes extends the great central plain, as in the northern continent, and, to complete the comparison, it should be noted that this plain is bordered on its eastern side by a series of low mountains known as the Highlands of Brazil, corresponding to the Appalachian Mountains.

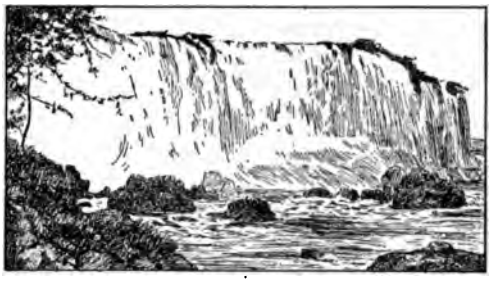
The great central plain, which occupies nearly two-thirds of the continent, can be divided into several distinct regions. In the south are the vast level plains known as the *pampas* of Argentina. North of this extends the broad plateau of Brazil, presenting alternate ridges and valleys, thickly covered with forests on the side next the Atlantic, and opening into steppes or pastures in the interior. North of this stretches the basin of the Amazon, a vast plain of more than 2,000,000 square miles, possessing a rich soil and humid climate. This region is covered with dense forests in which there are numerous wild animals, and is thinly inhabited by savages, who live by hunting and fishing. The basin of the Amazon is separated by the plateau of Guiana from the basin of the Orinoco River, which consists of extensive plains called *llanos*.

The Andes Mountains, especially in the region around the equator, contain several active volcanoes which are among the highest in the world. These are Chimborazo, 20,703 feet high; Cotopaxi, 19,613; Antisana, 19,335; Cayambe, 19,186; Maipo, 17,670; and Sangai, 17,464. This region is subject to frequent and violent earthquakes.

Rivers. South America contains the largest river system in the world—the Amazon—which drains nearly one-third of the continent. To

the north of the Amazon is the Orinoco River, and to the south is the Plata. These great river systems bear a striking resemblance to those of North America. Thus, the Amazon may be compared to the Saint Lawrence; the Orinoco to the Saskatchewan-Nelson; and the Plata to the Mississippi-Missouri. Among the other important rivers are the Tocantins, the São Francisco, the Rio Negro and the Colorado, all of which flow into the Atlantic. Because of the nearness of the Andes to the coast, the rivers flowing into the Pacific are short.

Lakes. In striking contrast with North America, the southern continent contains very few large lakes. The largest is Titicaca, situated in the Andes between Bolivia and Peru. It covers an area of nearly 5,000 square miles, or about two-thirds the area of Lake Ontario,



ONE OF THE LARGEST CATARACTS IN THE WORLD

The Falls of Iguazú, at the junction of three republics, Brazil, Paraguay and Argentina, where the Iguazú River joins the Parana, rank among the most magnificent spectacles of the world. They are forty-six feet higher and some hundreds of feet wider than Niagara. Situated in the midst of virgin, tropical forests, they make a remarkable impression on the tourist who is willing to stand the hardships and difficulty of reaching them from Buenos Aires, partly by rail, partly by steamer and several days' journey on horseback.

and lies at an altitude of 12,545 feet. It is 130 miles long, about thirty miles wide and has a maximum depth of 700 feet.

Climate. All of the continent north of Rio de Janeiro lies within the tropics, while the southern portion is in the south temperate zone. In contrast with North America, this continent has a remarkably equable climate, for in the northern portion the intense heat is greatly modified by the altitude, while the southern portion is free from sudden changes because of the nearness of the ocean and the influence of the mountains. The temperature during midwinter averages about 80° Fahrenheit in the north and 35° in the south; during midsummer it averages about 85° in the north and 50° in the south. The lowlands along the Orinoco and the Amazon and the coast of Brazil have a hot climate and a high degree of humidity. The seasons are here just the opposite of those in the northern hemisphere, summer occurring in December, January and February, and winter in June, July and August. The rainfall is heaviest in the Amazon basin, where it averages fifty to seventy-five inches a year, but reaches in some parts 200 inches and more. It diminishes gradually toward the south, until the arid region, constituting a large part of Argentina and most of Patagonia, is reached.

Vegetation. The vast tropical region is covered with a luxuriant vegetation represented by a large number of species, some of which are of gigantic proportions. Characteristic of this region are the tropical forests called *selvas,* which extend through the whole valley of the Amazon and constitute the greatest continuous forest area in the world. These forests contain giant trees whose upper parts are covered with lianas, creepers and all sorts of twining and climbing plants, while the ground under them is covered by a thick undergrowth, or jungle, which is impenetrable in many places. This type of vegetation is the result of the great heat and the high degree of humidity produced by the excessive rainfall. In the subtropical regions the chief trees are palms, bamboos, cedars, mahogany and ebony trees, while the mountains are covered with conifers, mostly South American pines. South of the Amazon Valley extends the forested plateau of Matto Grosso, which means *great woods,* and south of this is the region known as the Gran Chaco of Parana, where the wax palm is the typical tree. A native plant of this region is a holly, from the leaves of which a beverage called *maté,* or Paraguay tea, is produced. In Argentina forests of beech prevail.

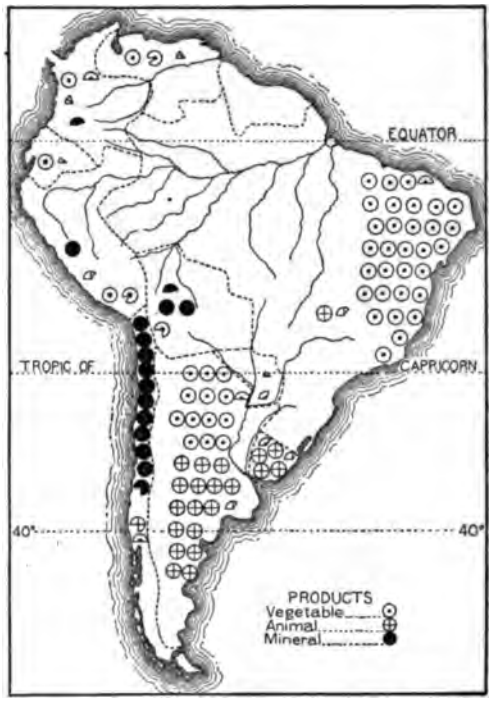
Among the valuable tropical trees of South America is the rubber tree. Several trees which yield important drugs are also found here. Among them are the cinchona (from which quinine is extracted), which grows on the eastern slopes of the Andes in Bolivia, Peru and Ecuador, and the coca tree (the source of cocaine), found in the tropical valleys of the Andes. There are numerous kinds of trees bearing fruits that are usually very large and covered with extremely thick shells. Among these are the cannon-ball tree and the Brazil-nut tree. Many useful tropical and subtropical plants have been introduced here and grow in abundance. Among them are cotton, tobacco, rice, coffee and cane sugar.

Animal Life. South America is noted for the richness and variety of its animal life, which is different in many particulars from that of North America. The southern continent not only contains a great number of species, but possesses many species of animals that are not found on any other continent. On the other hand, some of the commonest animals are not found here. About a fourth of all the mammals known occur in South America, but, curiously enough, almost all of the wild animals so abundant in Asia and Africa are missing.

The most powerful of the flesh-eating animals is the jaguar, which is the only formidable beast of prey on the whole continent. There are several families of monkeys, two of which differ from those of the Old World. A group of mammals peculiar to this continent consists of the toothless animals, such as the blood-sucking bats, sloths, anteaters and armadillos. Horses, cattle, sheep and goats were not among the native animals of South America, but there are found here such animals as the llamas and the vicuñas, which are relatives of the camel. The largest of the native mammals is the tapir. Wolves are not found in South America.

The birds of the tropical sections are noted for their brilliant plumage, and include humming birds, flamingoes, toucans, aracaris, chatterers and a great variety of parrots. The largest bird of prey in the world, the condor, is found in the Andes. Chief among the reptiles are alligators, boas, rattlesnakes and turtles. The rivers teem with fishes, and the number and variety of species found here are greater than in any other part of the world. In the tropical regions the insects are very numerous, including many species of butterflies of large size and gorgeous hues. The beetle family is also well represented, some species being much larger than those found in other regions.

Mineral Resources. The mineral wealth of South America is great and varied, and consists of gold, silver, copper, mercury, diamonds, coal and other valuable minerals. The celebrated silver mines at Potosi in Bolivia have yielded over $1,500,000,000 since the arrival of the Spaniards in these regions. There are considerable supplies of gold in Venezuela and Guiana. Brazil has extensive deposits of coal and iron, and previous to the discovery of the fields in South Africa it was the principal diamond country of the world. The desert coast of Chile constitutes the world's chief source of supply of nitrate, and is also rich in deposits of guano and borax.



SOUTH AMERICAN EXPORTS

Map showing distribution, by countries, of the three main classes of South American exports. Each circle equals $10,000,000. Amounts of less than $1,000,000 (animal products for Bolivia and for Ecuador; mineral products for Argentina, Uruguay, Paraguay and Ecuador) are not shown.

History of the Continent

During his third voyage of exploration in 1498 Christopher Columbus explored the island of Trinidad and first touched the mainland at the mouth of the Orinoco. During his fourth voyage of exploration, from 1502 to 1504, he coasted along the continent from the peninsula of Yucatan in Mexico to Venezuela. The next navigator to explore South America was Alonzo de Ojeda, a Spaniard, who followed the coast from near the equator to Venezuela. He was accompanied by Americus Vespucius, who published the first account of the New World, and whose name was given to the two continents. After Balboa had crossed the Isthmus of Panama and discovered the Pacific Ocean, Francisco de Pizarro conquered Peru in 1531-1534, and his companion, Diego de Almagro, pushed farther south into Chile. Francisco de

OUTLINE AND QUESTIONS ON SOUTH AMERICA

Outline

I. Position and Size

(1) Latitude and longitude (see map)
(2) Relation to other continents
(3) Greatest length, 4,800 miles
(4) Greatest breadth, 3,300 miles
(5) Area, 7,700,000 square miles
(6) Comparative area

II. Shape and Coast Line

(1) Roughly triangular—like North America
(2) Regular coast line—like Africa
(3) Few islands
(4) Coast waters

III. Geographic Features

(1) Resemblance of surface features to those of North America
(2) Andes
  (a) Chief peaks
(3) Central plain
(4) Highlands of Brazil
(5) Rivers
  (a) Amazon greatest in world
(6) Lakes
(7) Climate

IV. Vegetable and Animal Life

(1) Characteristic vegetation
  (a) Tropical forests
  (b) Economically valuable forms
(2) Animals
  (a) Absence of powerful wild animals
  (b) Forms peculiar to this continent

V. Minerals

(1) Silver and gold
(2) Other metals
(3) Nitrate

VI. The Inhabitants

(1) Native races
(2) European immigration
(3) Mestizos

VII. History

(1) Discovery and conquest
(2) Independence secured
(3) Revolutions
(4) Recent progress

Questions

Why is South America one of the first continents which the child in school is asked to draw?

What is the loftiest mountain peak on the continent? How does it compare with the loftiest of North America?

Why has South America a more equable climate than North America?

What white man first touched the mainland of the continent, and where?

How does the largest lake in South America compare in size with the smallest of the Great Lakes?

What mineral substance does one of the western desert regions produce, and for what is it used?

How does it happen that there is little or no color prejudice in South America?

What is the largest river system in the world? How long is the main river? What is the total length of navigable rivers in the system?

Name four common domestic animals of North America which are not native to this continent.

Is South America farther from the South Pole or nearer to it than Australia? How much?

Name two South American trees which yield important drugs. For what are they used?

How many of the continents are larger than South America? How many have a larger population?

Orellana crossed the Andes and, following the course of the Amazon from its headwaters to its mouth, reached the Atlantic Ocean in 1541. While the Spaniards were exploring the continent from west to east, the Portuguese began in 1531 to push into the interior from east to west. They eventually occupied the vast region of Brazil. Spain and Portugal had almost entire control of the continent until the beginning of the nineteenth century. The Spanish colonies declared their independence in 1810 and established several republics after the model of the United States. After a protracted struggle Spain formally recognized their independence in 1826. In 1823 Brazil became independent of Portugal and retained a monarchical form of government which lasted until 1889, when a republican form of government was adopted.

For the greater part of the nineteenth century these countries were disturbed by periodical internal revolutions, and their progress was in consequence slow. Since the beginning of the twentieth century more stable political conditions have prevailed and a great economic development has taken place, as the vast natural resources of the continent are being opened up. South America is playing to-day an important part in the international trade of the world. O.B.

Each country's history is treated in special articles in these volumes. In addition to reference books there referred to, consult Bryce's *South America: Observations and Impressions;* Post's *Across the Andes;* Bingham's *Across South America.*

Related Subjects. Much additional information on various phases of South American geography may be gained from the following articles in these volumes. Almost all of the articles on the political divisions also contain lists, so the range of reading indicated is a wide one.

ISLANDS

Falkland
Galapagos
Tierra del Fuego
Trinidad

MOUNTAINS

Aconcagua
Andes
Chimborazo
Cordillera
Cotopaxi

POLITICAL DIVISIONS

Argentina
Bolivia
Brazil
British Guiana
Chile
Colombia
Dutch Guiana
Ecuador
French Guiana
Paraguay
Peru
Uruguay
Venezuela

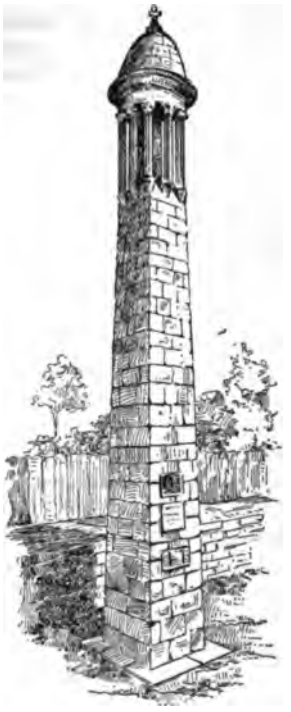
RIVERS

Amazon
Jurua
Madeira
Magdalena
Orinoco
Paraguay
Parana
Pilcomayo
Plata, Rio de la
São Francisco
Tapajos
Tocantins
Uruguay
Xingu

UNCLASSIFIED

Inca
Indians, American, subhead *South American Types*
Llanos
Patagonia
Selvas
Titicaca, Lake

SOUTHAMPTON, *south amp'tun,* a seaport in the extreme southern part of England, seventy-nine miles southwest of London. It occupies a peninsula lying between the estuary of the Test River on the west and the mouth of the Itchen on the east, where these waters discharge into Southampton Water, an inlet of the English Channel. Southampton is a coaling station, a port of call for several important mail steamship lines, and a fashionable seaside resort. In normal years 12,000 vessels annually enter its spacious, sheltered harbor, where double tides prolong each period of high water for three hours. There are six large dry docks here, and two coal-barge docks in which 10,000 tons of coal can be floated in one shipment. Industrial establishments include markets, slaughterhouses, shipbuilding yards and engine works. Public baths, a free public library and fine parks are among the attractive features of the town, which possesses also one of the oldest hospitals in England, the Domus Dei (God's House). A university college was established here in 1850. A Pilgrim Memorial Tower was erected here in Southampton in 1914; from Southampton the *Mayflower* set out on its perilous trip to the New World. Near the spot where the tower

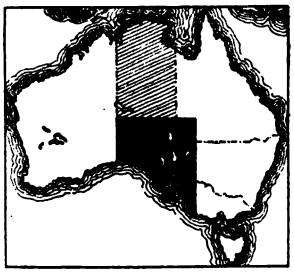


TOWER TO THE PILGRIMS

From Southampton the *Mayflower* sailed, on August 20, 1620. The memorial tower is 100 feet high and is built of granite.

stands many historic events occurred. It was here that, according to tradition, Canute, the Danish king of England, commanded the waves to retire. From Southampton Henry V's army embarked for France just before the battle of Agincourt. Population in 1911, 119,012.

SOUTH AUSTRALIA, *aws tra' li a,* an agricultural state of the British Commonwealth of Australia, occupying 380,070 square miles in the south-central part of the continent and bordering on the Southern Ocean and the Great Australian Bight (see colored map, following page 488). It is a level or gently-undulating plain, broken by several mountain ranges. The western plains are semi-arid and treeless, but the mountain slopes are heavily wooded with the eucalyptus, sugar gum and Indian cedar. The coast is deeply indented and penetrated by gulfs and bays. The largest of these are Spencer and Saint Vincent's gulfs, separated by Yorke's Peninsula. Eyre's Peninsula lies between Spencer Gulf and the Great Australian Bight on the west. The Gulf of Saint Vincent is partly enclosed by Kangaroo Island, the longest island of Australia. There are few rivers, the only stream of importance being the Murray. The highlands are studded with shallow lakes which are numerous but not permanent.



LOCATION MAP

The shaded area to the north is Northern Territory, which until 1911 was a part of South Australia.

The climate, though hot, is healthful and pleasant, as the average humidity is low. Along the south coast and in the highlands there is sufficient rainfall for agricultural purposes, but in the interior the annual precipitation is only from five to ten inches a year.

People and Education. According to the census of 1911 the population numbered 408,558; in 1914 it was estimated to be 438,173. The larger part of the inhabitants are of British or Australian birth; other Europeans include Germans and Scandinavians, and there are also several hundred Chinese.

There is no state Church, and the Church of England, though the largest denomination, has proportionally a smaller following than in any of the other Australian states. The other important religious bodies are the Roman Catholics, Congregationalists, Church of Christ and Salvation Army. There are also Jewish temples and Mohammedan and Confucian shrines.

Education is free, secular and compulsory. Much attention has been given to agricultural and technical training. Tree planting and nature study have been encouraged by the schools, and Arbor Day has been set aside as an annual holiday. There is a university at Adelaide, and also a state training school for teachers, a school of mines and an agricultural college.

Industries. Agriculture is the chief occupation. Large crops of wheat, barley, oats, hay and potatoes are raised in the south and east sections. Fruits, especially grapes from which quantities of wines are made, are extensively grown. Pastoral lands are leased by the government for the grazing of live stock. South Australia, however, is less devoted to pastoral pursuits than the other large states of the Commonwealth, and miles of arid grasslands are being converted into vineyards, orchards and orange groves with the introduction of irrigation, water for which is furnished by artesian wells. The eastern mountain ranges produce copper, gold, silver and other minerals, and the first gold mine of Australia was in this state. Manufactures are few and unimportant.

Transportation and Commerce. Besides having 2,000 miles of state railway, South Australia is to be crossed by 450 miles of the Transcontinental Railroad which is to connect Brisbane on the east coast of Queensland with Freemantle on the west coast of the continent. Adelaide, the capital and largest city, is a great shipping center and is the third largest port of Australasia. The exports include fresh and dried fruits, wheat, flour, wool and copper.

History and Government. The first colony in this state was established near Adelaide by a private English company in 1836. It later became a Crown colony, but self-government was restored in 1856 when the present constitution was adopted. In 1901 South Australia joined the Commonwealth, to which, ten years later, it ceded the Northern Territory.

The state governor, appointed by the Crown, is assisted by an executive council of six ministers and the justice of the supreme court. There is a parliament, consisting of the legislative council and the house of assembly. The former consists of twenty members elected for six years by property owners, teachers, ministers, etc. The lower house is composed of forty-six members elected for three years by

universal suffrage, the vote having been extended to women in 1899. Justice is administered by the supreme and vice-admiralty courts and inferior courts. E.B.P.

Consult Blacket's *History of South Australia;* Cockburn's *South Australia,* in British Empire Series.

Related Subjects. The reader is referred to the following articles in these volumes:

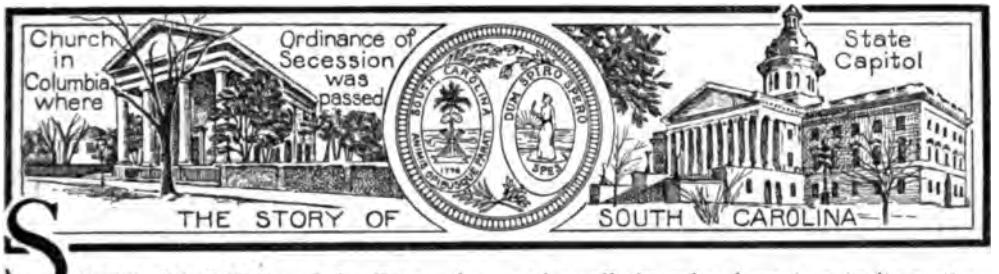
Adelaide	Great Australian Bight
Australia	Murray River

SOUTH BEND, IND., the county seat of Saint Joseph County, situated in the north-central part of the state on the south bend of the Saint Joseph River, eighty-six miles southeast of Chicago. Railroad lines entering the city are the Grand Trunk, the Michigan Central, the New Jersey, Indiana & Illinois, the New York Central, the Lake Erie & Western and the Vandalia. South Bend has electric interurban service. The population, which was 53,684 in 1910, had increased to 68,946 in 1916 (Federal estimate). The area is more than fourteen square miles. Two miles north of the city is the University of Notre Dame. Prominent features of South Bend are the Federal building, courthouse, city hall, public library, two public hospitals and city parks. The city has a large trade throughout a rich farming section, and is the home of two firms of international repute, the Studebaker Wagon Works and the Oliver Plow Company. In addition, there are manufactories of varnish, sewing machines, watches, automobiles and a great variety of other articles. According to local estimate, the value of the annual output is $60,000,000.

The site of South Bend was once occupied by a Miami Indian village; later it was the home of the Potawatomi tribe. The place was visited by French trappers and missionaries, and in 1824 a fort was established by Alexis Coquillard. An old Indian portage once passed where the city now stands. The town was incorporated in 1835 and became a city in 1865.

SOUTH BETH'LEHEM, PA., a city in Northampton County, in the east-central part of the state, and on the south bank of the Lehigh River, opposite Bethlehem. It is served by the Lehigh Valley Railroad and by electric interurban lines. South Bethlehem contains the Lehigh University, Bishopthorpe Manor (a seminary for girls), Moravian Ladies Seminary, Moravian College (theological), Sayre and Lehigh University parks, Saint Luke's Hospital and public library. The erection of a $100,000 Federal building was begun in 1916. Iron and steel works, foundries and machine shops, knitting mills, zinc and brass works, and manufactories of silk and furniture are the leading industrial establishments. The output of the city's industries is sometimes over $26,400,000 a year. South Bethlehem was settled in 1742 and became a city in 1865. In 1910 the population was 19,973; in 1916 it was 24,204 (Federal estimate).

SOUTHBRIDGE, MASS., a township in Worcester County in the south-central part of the state, twenty-one miles southwest of Worcester. It is on the Quinebaug River and on a branch of the New York, New Haven & Hartford Railroad and interurban lines. The city has a town hall, public library, Y. M. C. A. building and Notre Dame Church, and important manufactories of optical goods, woolen and cotton goods, knives, shuttles and cutlery. Southbridge was incorporated as a township in 1916. The population, which in 1913 was 12,592, was 14,217 by the state census of 1915. The area is twenty-one square miles.



SOUTH CAROLINA, *kair o li' na,* the smallest of the Southern states, distinguished for its aggressive and important part in United States history at a critical time. It was one of the thirteen original members of the Union, and at all times has been true to its motto—"Ready in soul and resource." The state belongs to the South Atlantic group, and is popularly known as the PALMETTO STATE. It has never adopted a state flower.

Size and Location. Lying on the Atlantic coast, between North Carolina on the north and Georgia on the south, the state covers a triangular area of 30,989 square miles, of which 494 square miles are water. It is about seven times the size of the state of Connecticut and ranks thirty-ninth in area among the states.

People. With the exception of Mississippi, South Carolina is the only state in the Union in which the colored population exceeds the white. In 1910 the total number of inhabitants was 1,515,400; of these 835,843 were negroes. In 1914 the negro population exceeded the white by 165,813. The total number of inhabitants January 1, 1917, was estimated to be 1,634,340. There is a very small percentage of foreigners. Over four-fifths of the population live on farms and plantations or in rural villages. Charleston is the only city having a population of over 50,000. Other large cities are Columbia, the capital, Spartanburg, Greenville, Anderson and Sumter, each of which is described under its title.

The Methodist and Baptist denominations are the largest, followed by the Presbyterian, Lutheran, Roman Catholic and Episcopal bodies.

Education. The predominance of the negro population has presented great difficulties in the matter of organizing an efficient educational system, and the illiteracy in the state is greater than in any of the other commonwealths but Louisiana. However, the fact that these problems are being handled successfully is shown in the statement that the illiteracy decreased from 35.9 per cent in 1900 to 25.7 per cent in 1910. The present system was established in 1868, but the high schools were not organized until 1907. Public education is administered by a state superintendent and a board of education consisting of the governor and seven members appointed by him. School attendance was not compulsory until 1915, but there had been a law prohibiting the employment of illiterate children in factories and mines. Separate schools are provided for all colored pupils.

The Normal Industrial, Agricultural and Mechanical College for the colored at Orangeburg, the Winthrop Normal and Industrial College at Rock Hill, the state university at Columbia, a military academy at Charleston, and Clemson Agricultural College at Clemson are maintained by the state. There are many other institutions of higher education, including Charleston City College, Erskine College at Due West, Wofford College at Spartanburg, Newberry College at Newberry, Presbyterian College of South Carolina at Clinton, and Furman University at Greenville; for the colored, there are Allen University and Benedict College at Columbia, Claflin University at Orangeburg, Ferguson-Williams College at Abbeville, Friendship College at Rock Hill, Harbison College at Ermo and Vorhees College at Denmark.

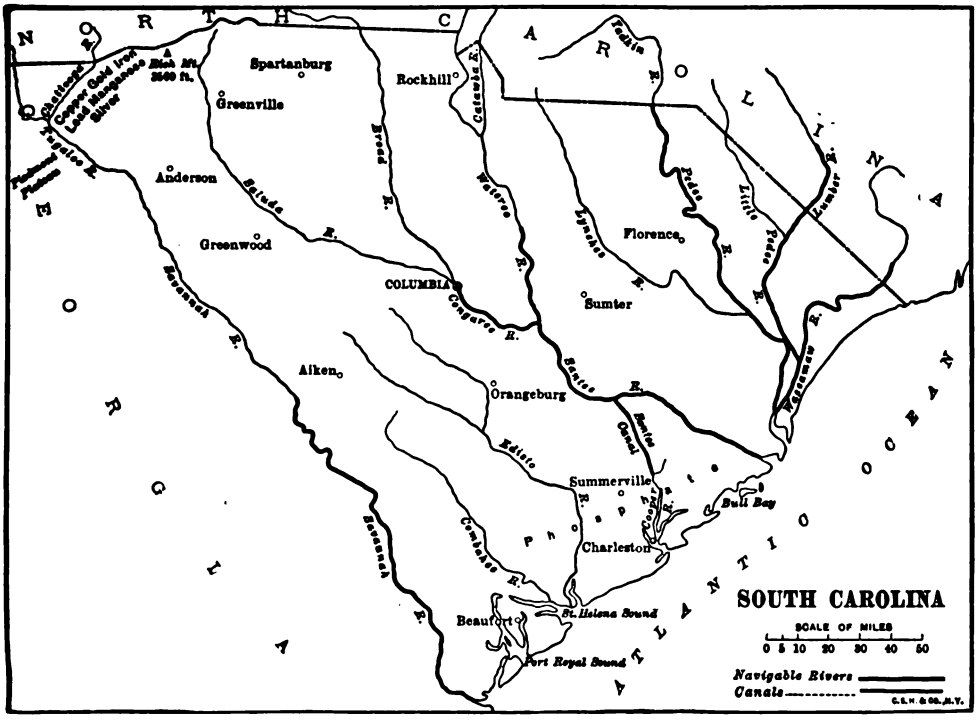
Charities and Corrections. A state board of charities and corrections was created in 1915. The public institutions for the dependent, defective and delinquent include an asylum for the insane, a Confederate infirmary, a reformatory for negro boys and a penitentiary, all at Columbia; an industrial school at Florence; an institution for the deaf, dumb and blind at Cedar Springs. There is a state tuberculosis sanitarium, but it is not a charitable institution. In 1913 contract labor was abolished in the penitentiary. There was notable legislation in 1915 relating to the care of the insane, and an appropriation of $600,000 for a period of four years was provided.

The Land. Except for a short distance in the north, the wide coastal plain is bordered by low islands, penetrated by winding creeks.

> "Sinuous southward and sinuous northward, the shimmering band
> Of the sand beach fastens the fringe of marsh to the folds of the land."

Along the southern coast there are dense groves of palmettos and magnolias. The vast marshes of reeds or of live oaks, gum trees and cypress, draped with moss and interwoven with vines, meet a sandy region known as the *Pine Barrens,* which rises gradually to the broken valleys and wooded uplands of the Piedmont plain, the western section of the state. This section rises abruptly above the coastal plain, and its forest-clad ridges reach an elevation of 1,000 feet in the northwest, where they meet the wooded foothills of the Blue Ridge Mountains. These beautiful hills and mountains are covered with a luxuriant undergrowth of azaleas, honeysuckle and jessamine, and echo with the songs of orioles, mocking birds and vireos. Their loftiest peaks, Rich Mountain (3,569 feet), Mount Pinnacle and Caesar's Head, rising about 3,000 feet, are in the northwest corner, where the Blue Ridge Mountains form the boundary with North Carolina. This region is the summer resort of the state.

Rivers. The northeast corner of the state is drained by the Great Pedee, which is fed by the Little Pedee, Waccamaw and Lynches rivers, and empties into Winyah Bay at George-



OUTLINE MAP OF SOUTH CAROLINA

Showing boundaries of the state, navigable rivers, chief cities, location of mineral deposits and the highest point of land.

town. It rises in the coastal plain, as does the Edisto, which flows into Saint Helena Sound. The Santee and the Savannah, the largest rivers, rise in the Piedmont uplands and flow southeast to the coast. The Santee is fed by the Wateree, Broad, Saluda and Congaree rivers, and the Savannah forms the entire southwest boundary with Georgia. At the fall line, along the eastern edge of the Piedmont plain, these rivers and numerous other mountain streams make an abrupt and rapid descent, developing a vast amount of water power, used by cotton mills and other factories. In the coastal plain they become sluggish; the tides push up their channels for fifteen to thirty miles and overflow the surrounding rice fields.

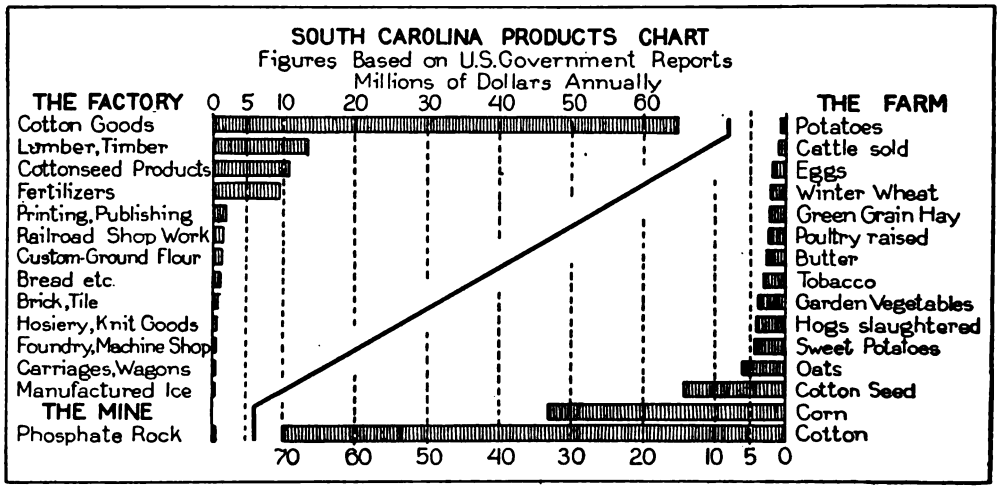
Climate. The mild climate of South Carolina resembles that of Southern Greece and Italy. Although it is almost tropical in the south, and the swamps are malarial and unhealthful, the uplands and mountain region are especially healthful and delightful. The average temperature for January is 45°, and for July 80°. Along the coast the climate is more equable than in the interior. In the northern mountains, temperatures below zero have been recorded, and at Columbia the mercury sometimes rises to 106°. The annual rainfall, averaging forty-nine inches, is heaviest during the summer months, but it is fairly evenly distributed throughout the state. Snow occasionally covers the mountains and uplands, but in the south and east sections it is rarely seen. The coast frequently is swept by severe West Indian hurricanes, which damage shipping and vegetation.

Sources of the State's Wealth

Agriculture. The climate and soil of South Carolina are suitable for all plants of the subtropical and temperate zones, and much of the state is farm land. Cotton is by far the most important crop. In 1915 the state was surpassed only by Texas and Georgia in the amount produced, though usually Alabama, which devotes a million acres more to cotton, stands third. The crop for 1915, as in all of the states, was considerably less than that of the preceding

year, though the yield per acre was above the average. Much sea-island cotton, the long fibers of which make it the best quality in the world, is grown on the low islands of the South Carolina coast.

Rice, which in the early part of the last century was the principal crop, and in which the state outranked all others in the Union, has decreased in importance. In 1859 South Carolina produced 64 per cent of the rice of the United States; in 1899, 19 per cent; in 1909 only 2.5 per cent, and in 1915 less than one-third of one per cent; this was in part due to large increase in production elsewhere. The large cereal crop of the state is corn; oats and wheat are also important. Tobacco, sweet potatoes and white potatoes are raised extensively, and truck farming is important in the coastal plain. Peaches, apples, pears, cherries and a few apricots and quinces are cultivated in the uplands, and figs, pecans and some oranges, lemons and other tropical fruits are grown in the southeastern section. Persimmons, plums and grapes grow wild in great profusion. In 1915 South Carolina ranked twenty-second among the states in the value of crops.



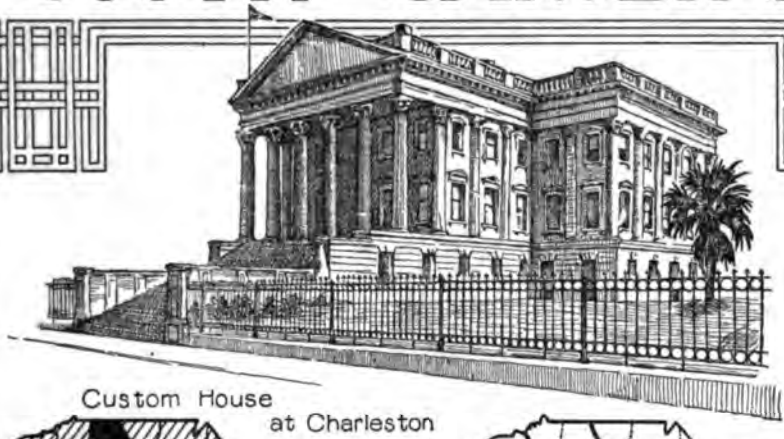
About sixty-eight per cent of the area of the state is woodland. The most important timber products are yellow pine, cypress and turpentine, rosin and tar from the turpentine farms in the "Pine Barrens." The latter products are decreasing, owing to the exhaustion of the pine timber supply.

Fisheries. The numerous bays and salt-water creeks of the coast contain extensive oyster beds, and oysters are the most important sea product of the state. Whiting, shad, sea bass, sturgeon, crabs and many other fish are abundant in these tidal waters, and some pike, perch, catfish and trout are caught in the inland streams.

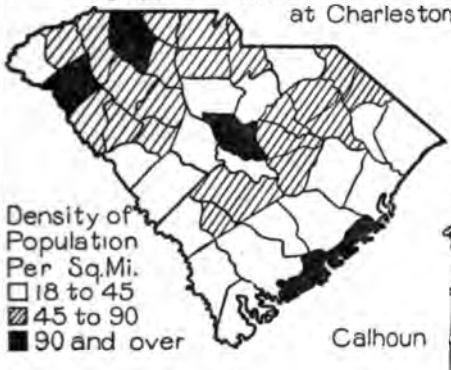
Mining. The most important of South Carolina's varied but not extensive minerals was long phosphate rock, a belt of which extends seventy miles along the coastal plain. This rock contains fifty-five to sixty-one per cent of phosphate of lime and is quarried both in the river beds and in the bordering banks. The clay of the coastal plain and east section of the Piedmont plateau now surpasses phosphate rock in importance. Granite and mica are quarried in the western mountains, and to a slight extent gold, silver and copper are worked. Talc, limestone, marble, bismuth, graphite, fuller's earth and brown coal are found, but are not commercially important.

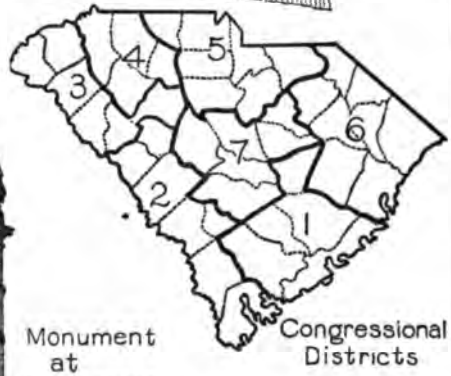
Manufactures. Although South Carolina is preëminently an agricultural state, its manufactures are developing rapidly, especially those related to agricultural pursuits. The abundance of material and water power and the excellent transportation facilities have been of chief importance in the development of industries. The predominant manufacturing interest is the weaving of cotton goods, in which South Carolina ranks third among the states, being surpassed only by Massachusetts and North Carolina. The value of cotton goods is over half the total value of the manufactures of the state. Lumber and timber products, cottonseed oil and cake, and fertilizers made from the phosphate rock are the other chief manufactures. South Carolina now ranks thirty-first among the manufacturing states.

SOUTH CAROLINA

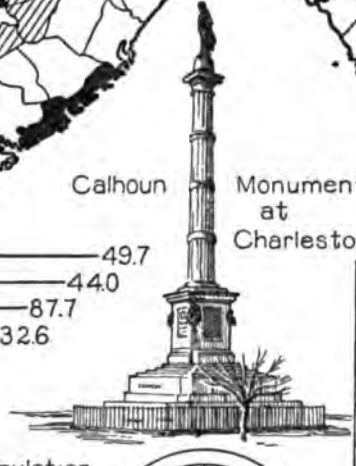


Custom House at Charleston





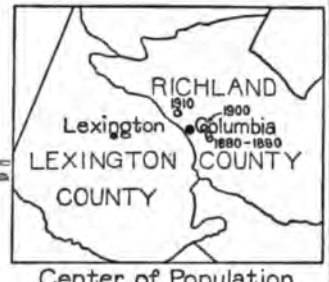
Congressional Districts



Calhoun Monument at Charleston

1910	49.7
1900	44.0
1890	87.7
1880	32.6
1870	23.1
1860	23.0
1850	21.9
1840	19.4
1830	19.0
1820	16.4
1810	13.6
1800	11.3
1790	8.1

Population Per Sq. Mi. By Decades



Center of Population

University of South Carolina, Columbia

Transportation. The railroad accommodations of South Carolina are unusually good. In 1915 there were 4,466 miles of railway in the state, the greater part being operated by the important trunk lines of the South, the Southern, the Atlantic Coast Line and Seaboard Air Line. There are also many shorter roads connecting with these main lines and over 100 miles of electric road. There are over 4,500 miles of improved road within the state.

The larger rivers are navigable by steamboats as far as the fall line, and the construction of two or three short canals would extend navigation to the western border. Canals have been proposed which would afford navigation beyond the Savannah and across Florida to the Gulf, opening a safer and shorter route to Panama. Charleston is one of the important seaports on the Southern Atlantic and is one of the greatest cotton ports of international trade. At Georgetown, on Winyah Bay, there is another important commercial harbor.

Charleston, Beaufort and Georgetown are ports of entry (see PORT OF ENTRY).

Government and History

Government. South Carolina has had six state constitutions; the present one was adopted in 1895. Amendments may be proposed in either house of the legislature, and if approved by two-thirds of the members of each house they are submitted to the voters. If accepted by a majority of the voters and the next general assembly, they become effective. Constitutional conventions may be called when voted for by a two-thirds majority in each house and a majority of state electors. In an attempt to restrict the negro vote strict qualifications for voters have been demanded. Only those male citizens are entitled to vote who are able to read and write any section of the Constitution; who have paid all taxes for the preceding year on property worth $300 or more; have lived in the state two years (ministers and teachers of public schools excepted), in the county one year and in the precinct four months, and have paid a poll tax six months previous to elections. Idiots, paupers, convicts and the insane are disqualified.

The *legislative power* is vested in a general assembly which consists of a senate and house of representatives. There are forty-four senators, half of the number being elected every two years, and 124 representatives, elected for two years. The legislature meets on the second Tuesday of each January.

The *executive department* consists of the governor, lieutenant-governor, secretary of state, comptroller-general, attorney-general, treasurer, adjutant and inspector-general and superintendent of public instruction, all of whom are elected by the people for two years. An insurance commissioner is elected by the general assembly for two years, a commissioner of agriculture is appointed by the governor and three railroad commissioners are elected for terms of two, three and four years each.

The *judicial power* is vested in the supreme court, circuit courts, courts of common pleas and general sessions. The chief justice of the supreme court and three associate judges are elected by a *viva voce* vote in the general assembly for terms of eight years. Eight circuit judges are elected in the same manner for four years, and justices of the peace are appointed by the governor.

The state constitution is peculiar in that it contains numerous provisions for the prevention of lynching and in being the only state constitution which prohibits divorce upon any cause. Since January 1, 1916, state-wide prohibition has been in force.

Colonization and Proprietary Government. South Carolina was visited by Spaniards from Cuba in 1520. In 1562 the French settled at Port Royal, but soon abandoned the settlement. About a hundred years later, Charles II of England, claiming the territory through discoveries in North America by Cabot, granted the tract including the Carolinas and extending as far west as the Pacific to a company of eight Lord Proprietors. The first permanent settlement was made at Charleston in 1670. The early history of the colony is a story of continuous struggle between the people and the Proprietors. The "Fundamental Constitution," framed by John Locke, outlined an impractical, obsolete feudal system which established the foundation of a slave-holding aristocracy and aroused the discontent of colonists, ending in the overthrow of the proprietary government in 1719. North Carolina and South Carolina, though a single province, had separate governors after 1712. See NORTH CAROLINA.

Royal Government. As a Crown colony the contests between the popular legislature and the royal governor and council continued. The spirit of democracy grew, and delegates were

RESEARCH QUESTIONS ON SOUTH CAROLINA

(An Outline suitable for South Carolina will be found with the article "State.")

What would be the cost of a South Carolina farm of average size, at the average price per acre?

Is the greatest altitude of this state higher or lower than the loftiest point of North Carolina? Of Georgia?

How have the relative values of the mineral products of the state changed within the last few years?

What remarkable record did the colony make as regards money contributions during the Revolutionary War?

In what particular do the fisheries of South Carolina resemble those of Maryland?

What eminent English philosopher had a part in drawing up the early instrument of government for the colony?

What change has been made within recent years in the method of treating convicted criminals?

How large a part of the area is under forests? How does the state compare in this respect with Georgia? With Arkansas?

Upon what did England base its claim to this region? Where was the first English settlement made?

Why has the educational problem in this state been unusually difficult? What indication is there that the difficulty is being overcome?

Of what crop in which the state long outranked all others does South Carolina now produce less than one per cent?

How has the negro vote been restricted without any direct mention of the negro?

How old is the present state constitution? How many constitutions had the state before the present one?

How does the state compare in number of inhabitants to the square mile with each of its bordering states? With the country as a whole?

How does South Carolina rank among the states with respect to its production of its most important crop?

What is the "fall line," and how can you trace it on a map on which it is not specifically indicated? See FALL LINE.

How many of the states are larger than South Carolina? How many of these larger states have a greater population?

How does the state compare in latitude with the European countries which it most resembles in climatic conditions?

What is the railroad mileage to each hundred square miles of area? How does South Carolina compare in this respect with the other Atlantic coast states?

What distinction did the state have in respect to the War of Secession? Who were the "carpetbaggers," and what harm did they do?

From what two great disasters did the state suffer in the late nineteenth century?

What is the state motto? How has South Carolina proved its right to this motto?

What is the popular name of the state? Describe the tree to which it has reference.

Of what advantage is it to a state to have a "fall line" distinctly marked?

What prohibition is contained in the constitution which is not to be found in that of any other state?

sent to the Stamp Act Congress and to the Continental Congress. The royal government was overthrown, and a state constitution was framed in May, 1776.

Statehood. South Carolina took an aggressive part in the Revolution, contributing more money than any other colony except Massachusetts, and as much as the other eleven combined. It also furnished many famous soldiers, among whom were Sumter and Marion. Because of its large number of Tory colonists, South Carolina was torn by bitter feeling and local conflict. Charleston and Fort Moultrie were attacked by the British, and after the surrender of the latter, the state was overrun by the English troops. Notable battles in South Carolina were Camden, King's Mountain, Hobkirk's Hill and Eutaw Springs.

After much discussion the Federal Constitution was ratified in 1788, and South Carolina became the eighth of the thirteen original states. The political conflicts were continued between the "low country," or rich planter faction, and the Scotch-Irish settlers of the "up country." The state was strongly anti-Federalist, and ardently advocated states' rights and free trade. In 1832, when the Clay Tariff Act was passed by Congress, South Carolina passed the Ordinance of Nullification, declaring the act null and void in the state, and secession was averted only by compromise. Under the leadership of John Calhoun, South Carolina became the spokesman of the South and the champion of slavery.

It was the first state to secede from the Union, and the first battle of the War of Secession was fought at Fort Sumter, within its borders. The white population was small, but over 60,000 men joined the Confederate army. Although the state suffered heavy losses during the war, the period of reconstruction was even more disastrous. During the "Carpetbag" government of Northern adventurers and negro politicians, crime and corruption were rife. The "Ku-Klux Klan," which had spread over the South for the purpose of suppressing negro power, had become lawless. The state had refused to ratify the Fifteenth Amendment, but had given the negro suffrage. In 1868 a new constitution was adopted, and the state was readmitted into the Union.

On May 31, 1886, much of Charleston was destroyed by a severe earthquake, and in 1893 the state suffered another disaster when the coast was swept by a tidal wave. The remarkable progress in industry and commerce made since the War of Secession by this and the other South Atlantic states was seen in the South Carolina Interstate and West Indian Exposition, held at Charleston in 1901-1902.

Other Items of Interest. The constitution denies the right to hold any state office to any person who does not believe in the existence of a Supreme Being.

The first printing press within the territory was set up in 1730, and two years later the first newspaper, the *South Carolina Gazette,* was established.

The clay yielded by South Carolina is chiefly of two kinds—that used for common brick and the "paper clay" used in the manufacture of paper.

The Edisto, 150 miles in length, is the longest river entirely within the state. It is navigable throughout its length for boats of light draft.

It is evident to geologists from certain features that the entire low region of the state was once under water. The old shore line ran through Columbia and Camden.

The average size of a South Carolina farm is 76.6 acres; the average value about $20 an acre. E.B.P.

Consult Watson's *Handbook of South Carolina;* McCrady's *The History of South Carolina;* White's *Making of South Carolina.*

Related Subjects. The following articles in these volumes will give much additional information about South Carolina:

CITIES

Anderson	Greenville
Charleston	Spartanburg
Columbia	Sumter

HISTORY

Calhoun, John C.	Ku-Klux Klan
Carpetbaggers	Nullification
Fort Moultrie	Reconstruction
Fort Sumter	States' Rights

LEADING PRODUCTS

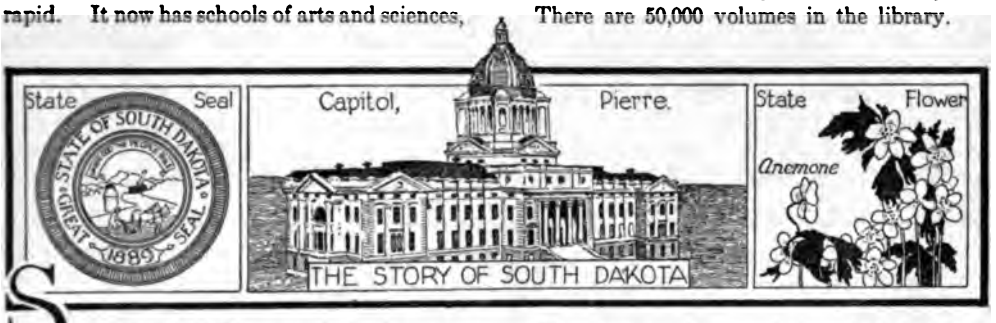
Corn	Oyster
Cotton	Tobacco

PHYSICAL FEATURES

Blue Ridge	Savannah River
Piedmont Region	

SOUTH CAROLINA, UNIVERSITY OF, a coeducational state institution located at Columbia. It was chartered by the general assembly in 1801 and opened in 1805 as the College of South Carolina. It prospered until the time of the War of Secession, when its halls were used first by the Confederates, then by the Union army, as a hospital. After the war the school was reopened, but was forced to close until

conditions in the state had had time for readjustment. The institution was organized in 1880 as a college, and in 1887 as the University of South Carolina. Since the last reorganization in 1906, the growth of the school has been rapid. It now has schools of arts and sciences, law and engineering, a school for teachers and a graduate school. The university conducts extension courses by lectures and by correspondence. There are over forty faculty members, and the student registration is nearly 600. There are 50,000 volumes in the library.



SOUTH DAKOTA, popularly known as the SUNSHINE STATE, one of the north-central states of the American Union. It lies partly within the great central prairies of the United States and contains a region of noted beauty and mineral wealth in the famous Black Hills. The name Dakota is the North American Indian word meaning *allies,* and refers to the allied Indian tribes, or Sioux Confederation, which occupied that territory. The flower emblem of the state is the pasque flower, an anemone.

Size and Location. The state lies between North Dakota and Nebraska, and covers a rectangular area of 77,615 square miles, of which 747 square miles are water. It is larger than all of the New England States together, or as large as Ohio and Indiana combined, and among the states of the Union ranks fourteenth in size.

The People. In 1910 South Dakota, with 583,888 inhabitants, ranked thirty-sixth in population among the states. About one-sixth of the inhabitants are of foreign birth, chiefly German, Scandinavian, Russian and Irish. There are over 20,000 Indians confined upon the six state reservations—Standing Rock and Cheyenne River reservations in the north, Crow Creek and Lower Brule River reserves in the central section, and the Rosebud and Pine Ridge districts in the south. On January 1, 1917, the population of the state was estimated to be 707,740. Fewer than one-fifth of the inhabitants live in towns and cities; the only cities with a population of more than 10,000 are Sioux Falls and Aberdeen. Other important towns are Lead, Watertown, Huron, Mitchell, Yankton and Pierre, the capital. See *Related Subjects,* at end of article.

The largest of the religious bodies is the Roman Catholic, other denominations of importance being the Lutherans, Methodists, Congregationalists, Episcopalians, Presbyterians and Baptists.

Education. A well-organized system of rural and city elementary and high schools is supervised by the state superintendent of public instruction and a board of five regents appointed by the governor. Under their direction are county superintendents and district boards of education. A large, permanent school fund is derived from the sale of land, two sections of which are set aside in each township for school purposes.

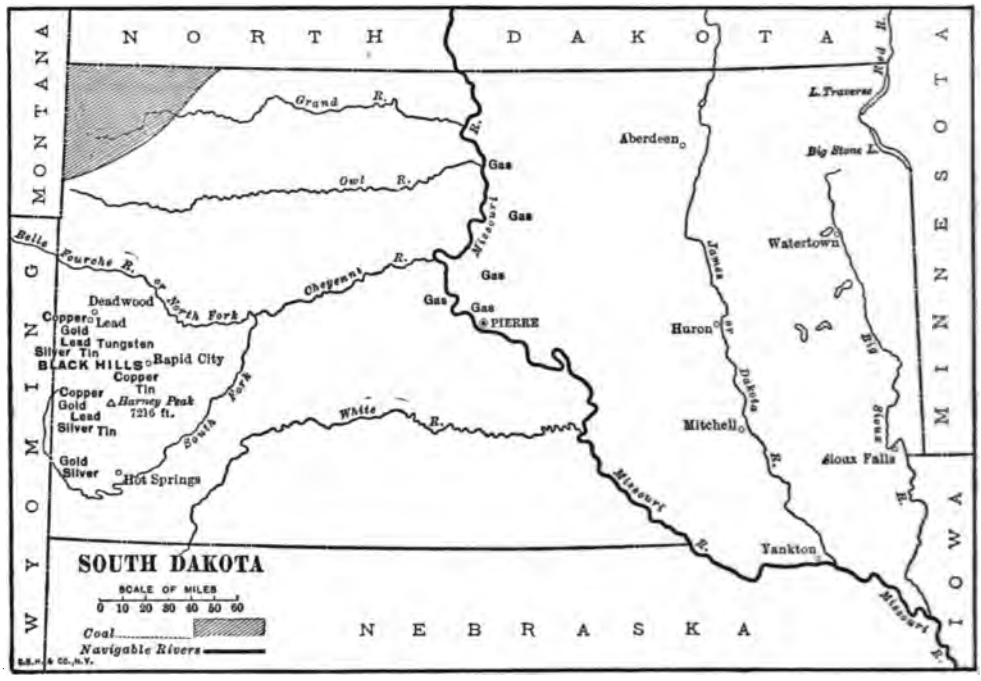
School attendance is compulsory for a specified number of weeks each year for all between the ages of eight and fourteen years, Indians included. The low illiteracy of the state, averaging 2.9, is the same as the general average for the west north-central states. Normal schools at Spearfish, Madison, Aberdeen and Springfield; the state university at Vermilion, an agricultural college at Brookings, and a school of mines at Rapid City are maintained by the state.

A board of five members, appointed by the governor, controls state institutions of charity and correction, which include a tuberculosis sanitarium at Custer; a school for the blind at Gary; an insane asylum at Yankton, where there is also a Federal hospital for insane Indians; an institution for the feeble-minded at Redfield; a reformatory at Plankinton; a soldiers' home at Hot Springs; the penitentiary and schools for the blind, deaf and dumb at Sioux Falls. The honor system is in force in the penitentiary and about forty per cent of the prisoners work outside of the prison. Free-

dom to talk at meals and during the Sunday social hour is granted, and moving picture shows are given for the prisoners.

The Land. South Dakota is an undulating plain, rising from the level prairie region of the east to the rough plateaus and buttes of the Black Hills. These hills and mountains, covered with dense, dark, pine forests, are cut by the magnificent canyons of the North Fork of the Cheyenne River and many mountain streams. Jagged peaks and domelike summits, open parks, thick forests, fantastically shaped sandstone, which have the appearance of gigantic mushrooms. Most of the region is bare clay of different colors, tan, gray, cream or pale green, but some of the hollows and flat-topped mesas are covered with grass and are used for grazing. Smaller districts of Bad Lands border the Grand, Moreau and Owl rivers.

The eastern prairies are broken in the north by rounded, wooded hills called the Coteau des Prairies. The central portion of the state is crossed by a table-land known as the Coteau



OUTLINE MAP OF SOUTH DAKOTA

Showing boundaries, navigable rivers, chief cities, extent of coal measures, location of gold, silver, lead, copper, tungsten and tin mines, and the highest point of land in the state.

pinnacles and mesas, caves and lakes afford scenery notable for its wild and weird beauty. Crystal and Wind caves, Spearfish Canyon, Cathedral Park and the fossil remains at the base of Matties Peak are especially noteworthy. In these hills Harney Peak, the highest point in the state, rises 7,216 feet.

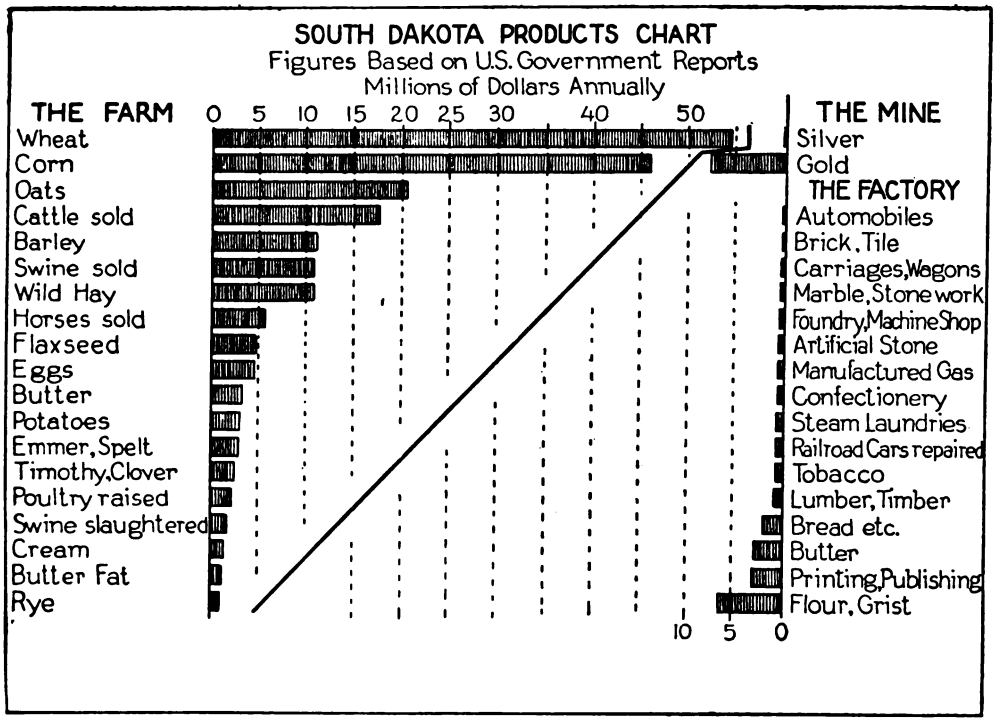
There are many isolated clusters of hills in the western and central sections, which are strangely shaped by wind and rain (see EROSION). Bordering the White River for 120 miles, in the southwest corner of the state, are South Dakota's noted Bad Lands, a maze of curiously-carved ridges and clay mounds from which rise grotesque pinnacles and columns, capped with

du Missouri. The lowest part of the state lies along the shores of Big Stone Lake on the Minnesota border, where the land is 970 feet above sea level.

Rivers and Lakes. The Missouri, crossing the central section of the state in a southeasterly direction, is South Dakota's largest river. Near the eastern border it is joined by the James River, which rises in North Dakota. Another tributary, the Big Sioux, forms the boundary between South Dakota and Iowa. The Grand, Owl, Cheyenne and White rivers rise in the hills of the extreme western part of the state and flow east through deep, narrow canyons to the Missouri. The largest of these

is the Cheyenne, dividing into the North Fork, or Belle Fourche, and the South Fork, which encircles the Black Hills. The extreme northeast corner of the state is drained by the Minnesota River, through Big Stone Lake.

This lake and Lake Traverse are long, narrow bodies of water forming part of the eastern boundary with Minnesota. The eastern prairies of South Dakota are dotted with many ponds and small lakes. Sylvan Lake, in the Black Hills, is a popular resort. The valleys of the James and Missouri rivers are underlaid with water which comes to the surface in hundreds of artesian wells, there being over a thousand of them east of the Missouri River.



Climate. South Dakota is noted for its cloudless skies, and no northern state has more days of sunshine. The climate is dry and is characterized by a wide variation in the annual temperature. The average yearly temperature is about 44°, which is higher than that of either Minnesota or New Hampshire, in the same latitude. The coldest part of the state is in the northeast, and the warmest region is in the southwest. The cold of the long winters is not keenly felt because of the lack of humidity. Snows are light and cattle graze in the open prairies during most of the winter. However, there are occasional blizzards, accompanied by high winds and severe cold. The annual rainfall averages twenty inches. It is heaviest during the summer months, and the greatest amount falls in the eastern river valleys and the extreme north-central and northwest parts of the state.

Agriculture. South Dakota is an agricultural state. The abundance of sunshine, the rich soil and the plentiful rainfall of the eastern river valleys are all favorable to the production of large crops of wheat, and in the output of spring wheat the state is surpassed only by North Dakota and Minnesota. For several years preceding 1917 South Dakota ranked fifth among the states in the output of wheat. Other cereals raised in large quantities include corn, oats and barley. Quantities of flaxseed, hay and vegetables, particularly potatoes, are grown, and apples, plums and cherries are extensively cultivated. Large herds and flocks graze in the central and western prairies, and stock raising and dairying are important industries.

There are fringes of timber along the streams and a few planted groves in the east, but the only extensive forest area is in the Black Hills. Here there is a forest reserve of 1,893 square miles. Since 1913 a bounty has been provided

for the planting of forest trees. The national forests of South Dakota, embrace 1,129,208 acres, in the Black Hills region.

Irrigation. The irrigated area is chiefly confined to the Black Hills region, and the Belle Fourche and Owl Creek supply the largest systems. Where irrigation is needed in the eastern section, water is furnished by the numerous artesian wells, many of which have a flow of from 2,000 to 4,350 gallons per minute.

Mining. The Black Hills constitute one of the most valuable gold districts in the United States, and are said to contain the richest hundred square miles in the world. Producing about one-twelfth of the gold output of the states, South Dakota is outranked only by California, Colorado and Nevada. In 1915 the state's gold product was valued at $7,400,000, and practically all of it was produced by the famous Homestake Mine at Lead City. Silver is another important product, and lead, copper, tin, iron, mica, tungsten, graphite, granite, sandstone, limestone and other valuable minerals are found in the Black Hills. An excellent paving and building stone, known as red quartzite, or Sioux Falls jasper, is quarried along the Big Sioux River. Chalkstone, used in the manufacture of cement, is found near Yankton, and large quantities of brick and fire clays are produced.

Manufactures. Manufacturing is closely related to the agricultural pursuits; it is as yet of small importance. The milling of the great wheat crop is the chief industry. The production of butter, cheese and condensed milk is second in importance, followed by printing and publishing and the manufacture of lumber and timber products. South Dakota in 1910 ranked forty-fourth among the states in the value of manufactured products, but in 1915 there was an increase of 35.7 per cent in the value.

Transportation. All sections of South Dakota are penetrated by railroads, and short branch lines and spurs are being extended into newly-developed districts. In 1915 there were 4,240 miles of railroad in the state. The chief roads are the Chicago, Milwaukee & Saint Paul; the Chicago & North Western; the Chicago, Burlington & Quincy; the Great Northern, and the Chicago, Rock Island & Pacific. In 1915 there were 56,354 miles of public road, only 290 miles of which were paved. With careful piloting, the Missouri is navigable between Sioux City, Iowa, and Fort Benton, Mont.

Government and History

Government. South Dakota is governed by its original constitution, adopted in 1889. A convention for the revision of the constitution may be called if approved by two-thirds of the members of each house of the legislature and a majority of the voters. Amendments must be approved by a majority of the members of each house and by the voters. All male citizens over twenty-one years of age, or those who intend to become citizens, and who have lived in the United States one year, in the state six months, in the county thirty days and in the precinct ten days, are entitled to vote. The proposition to adopt full woman suffrage was defeated in 1914, and again in 1916. The right to the initiative, applying to statutes, though not to amendments, is in force. Not less than five per cent of the electors may propose measures which the legislature shall enact and submit to a vote. There is a referendum law.

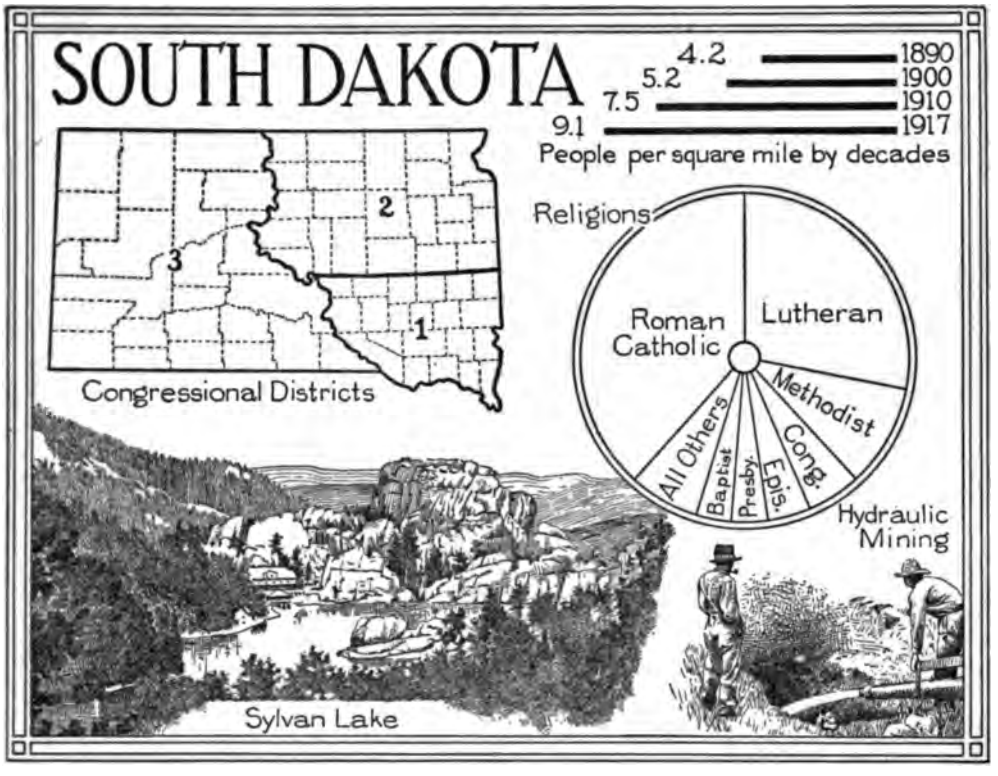
The *legislature* consists of a senate and a house of representatives, elected biennially. The senate is composed of not less than twenty-five nor more than forty-five members, and the house of representatives of not less than seventy-five nor more than 135 members.

The *executive officials* are the governor, lieutenant-governor, secretary of state, auditor, treasurer, attorney-general, superintendent of public instruction and commissioner of school and public lands, all of whom are elected biennially. The treasurer cannot be elected for more than two successive terms. The governor's power of veto does not extend to measures passed by popular vote.

The *judicial department* consists of the supreme court, circuit and county courts, justices of the peace and police magistrates. All judges are elected by the people.

In 1915 capital punishment was abolished, and in 1916 a constitutional amendment prohibiting the liquor traffic was approved by the voters.

History. The present state of South Dakota was explored by Lewis and Clark in the Northwest Expedition in 1804-1806. The *Yellowstone,* the first steamboat on the Missouri, ascended the river to Fort Pierre in 1831, where, during the next year, a trading post was established by the American Fur Company. This settlement was later sold to the government and became an important military post of the



Northwest. In 1856 a permanent industrial settlement was made at Sioux Falls, and within a few years many settlements were established along the Missouri River and in the eastern part of the present state.

The Dakotas were a part of the Missouri Territory until 1820, and the eastern section was successively included in the territories of Michigan, Wisconsin, Iowa and Minnesota. From 1854 to 1861 the western part of the present states of North Dakota and South Dakota was included in Nebraska Territory. In 1861 the Territory of Dakota was organized, including North Dakota, South Dakota and parts of Wyoming and Montana (see NORTH DAKOTA). Its development was retarded by the War of Secession and local Indian disturbances. Under the famous chiefs, Spotted Tail, Red Cloud and Sitting Bull, there were many serious uprisings, known as the Sioux Wars.

In 1882 the Dakotas acquired their present limits, and the territory was divided into two sections. The south section was the first to frame a constitution, and in 1885 it applied for admission into the Union. In 1887 the proposition for the division of the territory into two states was approved by the voters. Two years later the constitution of 1885, with slight changes, was adopted, and on November 2, 1889, South Dakota became the fortieth state of the Union.

The Indians were finally defeated by General Nelson A. Miles in the Battle of Wounded Knee in 1890, and since that time their lands and reservations have steadily decreased in size, and the development of the state has been rapid.

Other Items of Interest. The *Devil's Tower* is the name given to an isolated, fluted column of rock which rises from the comparatively level land along the North Fork of the Cheyenne to a height of more than six hundred feet.

In the Black Hills region is a group of hot springs whose curative properties attract many visitors. The Indians believed these springs to be the home of the Great Spirit, and had great faith in their curative properties.

Parts of South Dakota feel the influence of the Chinook winds (see CHINOOK), which melt the snows with great rapidity. Less beneficial are the hot winds which in the summer sometimes sweep up from the hot, dry regions far to the south, withering and blighting the crops in their path.

RESEARCH QUESTIONS ON SOUTH DAKOTA

(An Outline suitable for South Dakota will be found with the article "State.")

What and where are the Bad Lands? For what are certain portions of this region useful?

Where, so far as is known, is the richest hundred square miles in the world? What makes it so?

Which had a constitution first, North Dakota or South Dakota? How many states entered the Union between the close of the Revolution and the entrance of South Dakota?

What is the Devil's Tower and where is it located?

What are some of the scenic features of the Black Hills region?

Is the loftiest point in South Dakota higher or lower than that in each of the states upon which it borders?

What is the difference in the way water for irrigation is obtained in the eastern and the western sections of the state?

Of how many territories has the South Dakota region formed a part?

What Indian chief was most famous in the history of this region?

What advanced theories have been put into practice in the penal system of the state?

What effect did the absence of trees in the Dakota territory have on the homestead laws?

What was the first steamboat on the Missouri? When did it reach the Dakota region?

How is the permanent school fund secured? How does the state rank, as regards illiteracy, with others in the west north-central group?

How many states surpass South Dakota in the production of its chief crop? Does this number seem to be growing or decreasing?

What is the difference in the method of punishment for murder in South Dakota and in Illinois?

What stand has the state taken on the liquor question?

How does the state compare in its number of Indian inhabitants with North Dakota? With Oklahoma?

Is the population largely rural or urban—that is, do more of the inhabitants live in the country or the city?

What is a blizzard, and how does it differ from an ordinary storm? Where does it originate, and what causes it? See BLIZZARD.

How many constitutions has the state had?

What advanced legislation has been adopted?

How many states are larger than South Dakota? How many of these larger states have a greater population?

Where are the Black Hills located with respect to the Cheyenne River?

What is the railway mileage to each hundred square miles of area? How does the state compare in this respect with the states that bound it?

What is South Dakota's popular name? What right has it to this name?

What does the proper name of the state mean?

How much below the highest point in the state is the lowest point?

What two famous soldiers took part in the engagements against the Indians in the Dakota region?

The town of Deadwood is situated nearly a mile above sea level.

Some of the artesian wells of the state exert a pressure so remarkably strong and regular that they are used for driving machinery and putting out fires.

In the opening up of many territories settlers gained their right to land by making "clearings"—that is, by cutting down the trees over a certain portion of their holdings; in the Dakota region, on the other hand, early homestead laws required the planting of a certain number of trees. E.B.P.

Consult Robinson's *Brief History of South Dakota;* Armstrong's *Early Empire Builders of the Great West.*

Related Subjects. The reader who is interested in the study of South Dakota will find much helpful material in the following articles:

CITIES AND TOWNS

Aberdeen	Pierre
Lead	Sioux Falls
Mitchell	Yankton

HISTORY

Custer, George	Miles, Nelson A.
Armstrong	North Dakota, subhead
Lewis and Clark Expedition	*History*
	Sitting Bull

LEADING PRODUCTS

Gold	Wheat
Silver	

PHYSICAL FEATURES

Bad Lands	Minnesota River
Black Hills	Missouri River

SOUTH DAKOTA, UNIVERSITY OF, a state institution located at Vermilion, founded by act of the first territorial legislature of 1862. The school was first opened to students in 1883. When the state was admitted to the Union in 1889, the university received seventy-two sections of land. Tuition fees are very small, and the annual income is largely from an appropriation by the state legislature and income from the land grants. The university is organized into colleges of arts and sciences, law, medicine, engineering and music. The state conducts its work in geology, natural history, public health and pure food and drugs through the institution. There are about sixty instructors and over 680 students. The library contains more than 31,000 volumes.

SOUTHERN CROSS, a famous constellation in the southern hemisphere. Its southernmost star is of the first magnitude, the eastern and northern stars of the second magnitude, and the western star of the third. The four stars are not arranged in the exact form of a cross, therefore to distinguish the constellation is difficult except to one long familiar with it. The upper and lower stars, forming the upright of the cross, are the pointers to the south pole. This constellation is by no means as splendid as many constellations in the northern hemisphere, and is usually considered disappointing by those who see it for the first time.

For explanation of magnitude, see STAR, subhead *Magnitude.*

SOUTHEY, *south'i,* ROBERT (1774-1843), an English poet and prose writer, associated with Wordsworth and Coleridge in the Lake School. He was born at Bristol, but lived during most of his boyhood with an aunt at Bath, having at an early age lost both parents. He studied at Westminster School, from which he was expelled for writing a satire on flogging, and later at Oxford, where he remained only two years. In 1794, with Coleridge and Lovell, he planned a socialistic colony, or "pantisocracy," to be founded in America, but the scheme was never carried out. In the following year he married Edith Fricker, a sister of the lady who later became Coleridge's wife, and soon afterward went with his uncle to Portugal.

After his return to England he established himself with his wife at Keswick, in the Lake District. Here he devoted himself to study and to the production of his numerous and varied writings, working always with great diligence. In 1807 the government granted him a pension of £160 a year, which was later increased to £460. The income from his books was also considerable. Early in his life Southey had been a pronounced radical in politics, as in religion, but as he grew older he became more and more conservative; and in 1813, when he was appointed poet laureate, he was a stanch Tory. In 1837 his wife died, after a period of insanity, and two years later he married Caroline Bowles. From the time of his second marriage until his death his mind grew weaker and weaker, until it became an absolute blank.

Southey is to-day ranked higher as a prose writer than as a poet. Indeed, in his own day, Byron, one of the sharpest critics of his poetry, said, "Southey's prose is perfect." Prose was his natural medium of expression, and he himself felt that he was scarcely justified in putting his thoughts into verse, though some of his poems were very popular. Among his poems are *Joan of Arc; Thalaba, the Destroyer; Madoc; The Curse of Kehama* and *Roderick, the Last of the Goths,* all narratives based on legends and myths, and a *Vision of Judgment,* written in honor of George III. Some of his

prose writings are a *History of Brazil,* a drama *Wat Tyler,* the *Letters from England by Don Manuel Alvarez Espriella, The Doctor,* and biographies of Nelson, Wesley and Bunyan. In *The Doctor* appeared an old folk tale—the story of *The Three Bears.* A.MC C.

Consult Dowden's *Southey,* in English Men of Letters Series.

SOUTH O'MAHA, a former city in Douglas County, Nebraska, since 1915 a part of the city of Omaha (which see). Previous to its incorporation it had a population of 27,000. In the South Omaha district are several large meat-packing establishments. The place was first settled in 1882.

SOUTH PO'LAR EXPLORA'TION. See POLAR EXPLORATION.

SOUTH SEA COMPANY, an English trading company founded in 1711. For the exclusive right to trade in the South Seas, the wealth of which was considered boundless, and on the agreement of the government to pay £600,000 a year (about $3,000,000), the company took over £10,000,000 ($50,000,000) of the national debt. The corporation received the right to supply the Spanish-American colonies with slaves, and in the spring of 1720 assumed the entire national debt of £30,000,000 ($150,000,000). The stock soared to 1,000, and then suddenly the directors began selling it. Law's Mississippi Scheme (which see) collapsed in France simultaneously, and the English stockholders were plunged into a panic. Every one sold, the company became bankrupt, and England's financial stability was threatened. At the suggestion of Sir Robert Walpole the company was investigated and found fraudulent; the property of the directors was seized, and about one-third of the original investment was restored to the stockholders.

SOVEREIGN, *sov'er in,* or *suv'er in,* a current English gold coin, of the value of £1 and weighing 123.274 grains troy. The sovereign is the standard monetary unit of Great Britain, its fineness being fixed at 916.66, or twenty-two carats. It was first issued by Henry VII in 1489; on its surface was stamped the figure of the king, crowned and in his royal mantle, seated on the throne, holding the scepter and orb. At that time the coin weighed 240 grains. It was used in this form until the reign of James I, when the name *Unite* was given to the coin, to commemorate the union of England and Scotland. Until 1816 the gold coinage of the kingdom was a secondary part of the monetary system, but in that year the silver standard was discontinued and the gold standard was adopted (see BIMETALLISM).

George III chose the sovereign for the new unit of currency, and it was first issued in its present form in 1817. At the same time began the issue of the half sovereign, of proportionate weight. The weight of 934½ sovereigns is equal to the weight of twenty troy pounds, and this is used as a basis for the weight of the sovereign. It is eleven-twelfths pure gold and one-twelfth copper.

The sovereign is equal to twenty English shillings, and to about $4.86 in the coin of the United States and Canada.

SOVEREIGNTY, *sov'er in ti,* the political condition of a state by which it has power to impose its will continuously and without exception upon all persons and matters within its jurisdiction. In other words, such a country knows no higher power than its own mandates.

The modern use of "sovereign" as applied to a state signifies that that particular state possesses the right not only to form its own laws and conduct its own internal and external affairs, but also has the right to declare war without reference to or consent of any other state. The separate states of the American Union cannot properly be regarded as sovereign states, for while possessing many of the attributes of sovereignty, they cannot be regarded as absolutely independent concerning external affairs affecting the whole of the United States. On all matters internal, affecting only itself, each state is sovereign. No separate state of the Union can force its will upon any other state. The sovereign power lies in the federation of states.

The modern conception of sovereignty differs considerably from that of the French king Louis XIV, who said, "I am the State." The democratic tendencies in all countries are leading people clearly to see that the sovereign power lies in the hands of the people, and its expression must be the will of the people. An approach to the government of the people "for the people and by the people" is being more and more manifested.

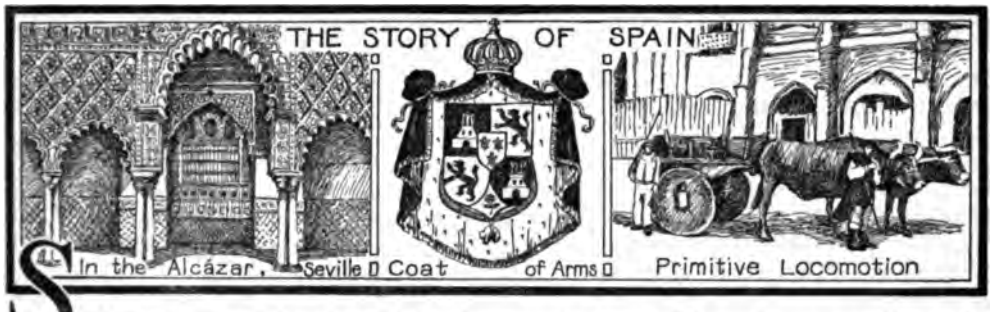
Consult Merriam's *History of the Theory of Sovereignty Since Rousseau.*

SOWING MACHINE, SEEDER, or DRILL, a machine for planting grain. Formerly all grain was sown by hand, and in regions where farms are small this practice is still continued. Among the earliest forms of sowing machine was one consisting of a cylindrical vessel with small holes at regular intervals. The cylinder

was mounted on a vertical axis and made to revolve rapidly by hand or other power. The seed was thrown out through the holes and scattered evenly over the ground. The first of these machines were useful only for round seeds, like turnip seed. Later modifications of it were successful in sowing grain. The machine was attached to a wagon which operated the seeder as it moved over the ground.

The modern seeder or drill now in use consists of a narrow chest or box eight or ten feet long, with circular openings in the bottom from three to four inches apart. This box is mounted on two wheels, one at each end. Iron tubes extending to the ground connect with the openings in the bottom of the box. At the lower end of these tubes is attached a device for making a small furrow or drill. Back of each tube is a small wheel or other device for covering the grain. The box contains a revolving brush for the purpose of distributing the seed evenly. There is also an adjusting device to adapt the seeder to grains of different sizes. These drills are drawn by a team of horses and, under ordinary conditions, one of them will plant from eight to ten acres a day on fairly-level ground.

SOW THISTLE, *sou this''l,* a group of weeds belonging to the Composite family. Though native to Europe, several species have been introduced into the United States, where they have become a nuisance in pastures and grain fields. The common sow thistle grows to be two or three feet tall and has a branching stem, milky juice and small, yellow blossoms. In the north of Europe the peasants use the tops and leaves of the plant as a potherb. The sow thistle can be eradicated only by careful cultivation and the planting of crops which will check its growth.



SPAIN, *spayn,* a kingdom of Southwestern Europe, a picturesque country of romantic traditions, with a civilization that is a curious blending of ancient customs, medieval grandeur and modern ideas. It was under the flag of Spain that Columbus discovered America, and Spanish navigators played an all-important part in the exploration and settlement of the New World. In the sixteenth century this kingdom was the most powerful nation in the world. Yet, of its numerous colonial possessions, which practically encircled the globe, none remain but small districts on the north and west coasts of Africa and a few small islands in the Gulf of Guinea.

Size and Location. Having an area of 190,050 square miles, continental Spain is about twice the size of the state of Oregon, or almost nine times the size of Nova Scotia. Including the Canary and Balearic islands, the area is 194,783 square miles. Spain occupies the greater part of the Iberian Peninsula. Its northwestern provinces border on the Atlantic, but the country is cut off from the ocean on the greater part of its western boundary by Portugal and on the extreme south by the English fortress of Gibraltar, which is situated at the end of a long isthmus known as Neutral Ground. Spain's east coast forms the western boundary of the Mediterranean Sea.

The People and Their Customs. Spain is a country of sunlit courtyards surrounded by picturesque balconies. Nearly every dwelling, from the meanest cottage to the most magnificent palace, has barred or latticed windows. Not less picturesque than their cities are the buoyant, gayly-dressed people themselves. They are of medium height and of dark complexion, the women being especially noted for their beauty, dignity and grace. Even in the decline of his country the Spaniard did not lose his proud bearing; "he seldom looks at the ground as if he contemned it," but his great fault is that "he cares not how little he labors." It seems most inconsistent that these lighthearted people, loving the light fandango and

music of the castanet and guitar, should find their chief amusement in the cruel bullfight, attractive to others only for the pomp and pageantry with which it is attended, and forbidden in most countries.

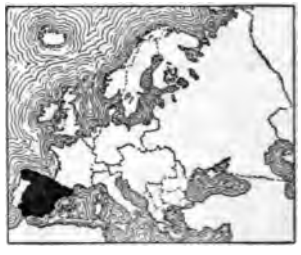
The Spanish are descended from the early Iberian inhabitants of the peninsula and the Roman and Teutonic invaders. The Basques of the north, numbering about 60,000, are more purely Iberian than the other inhabitants, and differ in language and customs. There are many tribes of gypsies scattered throughout the country. The total population of Spain, numbering 20,355,983 (estimate for 1913), is smaller than that of any other country having as old a civilization and equal natural resources. The most barren province of Ireland is not more scantily populated. The present population is less than one-third of that of the kingdom when in the height of its power. This decrease in population is due to the expulsion of the Moors, to the wars of the sixteenth and seventeenth centuries and to emigration.

Unlike Italy, Spain has a large rural population and comparatively few important towns. The largest cities are the capital, Madrid, and Barcelona, both having over 580,000 inhabitants, and Valencia, Seville, Malaga, Murcia, Saragossa and Cartagena, each having a population of over 100,000. See list of *Related Subjects* at the close of this article.

Education. Since intellectual advance usually accompanies material progress, Spain's educational development has been slow, and two-thirds of the people are illiterate. Although compulsory education with an elaborate system of primary schools, was authorized in 1857, the law was not enforced until 1909. Public schools are maintained by local taxation and are under governmental inspection. There is at least one high school in every province. These give preparation for the ten universities of Spain, which are located at Barcelona, Granada, Madrid, Oviedo, Saragossa, Salamanca, Santiago, Seville, Valencia and Valladolid. The government also supports special schools, such as those of engineering, agriculture, music and fine arts.

Religion, Language and Literature. Spain still holds its reputation as "the most Catholic country in the world." It is a land famed for its houses of worship; the cathedral at Seville is one of the most magnificent of Christian churches. The Roman Catholic churches and clergy are supported by the state. There are numerous influential Orders, but since 1910 the establishment of additional religious houses without the consent of the government has been prohibited. There are about 30,000 Protestants, 7,000 Jews and 4,000 Rationalists in the country.

The sonorous Spanish language is derived from the Latin. The Castilian dialect is the chief language of the country. The Galician and Catalan, which more closely resemble the French, are spoken in the northern and eastern provinces; the Andalusian dialect of the south is also the language of South America and Mexico.



LOCATION MAP

The southern point of Spain extends farther south than the most northerly point on the African coast.

The romantic songs and tales of the twelfth century marked the beginning of the national literature of Spain. No other country is so rich in these heroic ballads, most of which celebrate the deeds of Charlemagne and the Cid (see CID, THE). Juan Ruiz is among the most distinguished of the early romance writers, and Juan Manuel is noted as a prose writer of this early period. The greatest writers of the Golden Age of Spanish literature (1550-1650) were Calderon de la Barca and Lope de Vega Carpio, the great poets and dramatists, and the famous Cervantes, author of *Don Quixote*, one of the world's masterpieces of fiction (see VEGA CARPIO, FÉLIX LOPE DE; CERVANTES SAAVEDRA, MIGUEL DE). During this period Spain invented the picaresque novel, that is, one having for its hero a "picaro," or rogue. This type of story was widely imitated in other countries.

The seventeenth century was a period of dramatic production, but in the next hundred years the national literature declined. The Spanish writers were largely imitators of the French, and the great wave of democracy and spirit of freedom which swept over Europe in the nineteenth century reached Spain through France. During the latter part of the nineteenth century, and early in the twentieth the novel was the most prominent literary form in Spain.

Art. See PAINTING, subhead *Seventeenth Century*. Spain produced Velasquez, a painter who ranks with the greatest masters of the art, and another, Murillo, who ranks also among the very great.

The Country and Its Industries

The Land. Spain is a country of contrasts, not only between the old and new civilizations, but in its natural features as well. It is a country of boundless plains and rugged sierras, barren mountains and fertile valleys, trackless and silent wastes and flourishing gardens of the vine, olive and orange. In the northwest provinces, bordering the Atlantic and the Bay of Biscay, there are fertile meadows and fields of flowers, such as those of England, and dense forests of oak, beech and chestnut. In the south there are rich sections of luxuriant tropical vegetation, but barren steppes, studded with a few fertile oases, border the southeastern coast.

Three-fourths of the peninsula is a treeless table-land 1,000 to 3,000 feet above the sea, enclosed by high mountains and broken by rough sierras. This plateau is divided into two parts by the Sierra de Guadarrama and Sierra de Gredos. The wooded Cantabrian Mountains form a barrier on the north, and the Sierra Morena range bounds the plateau on the south. The mountains in Murcia and Aragon shut off the Mediterranean on the east.

On the north, Spain is separated from France by the Pyrenees, the highest summit of which is the Pico de Aneto (11,160 feet). Near the southern coast rise the lofty Sierra Nevada Mountains, whose culminating peak, Mulhacén (11,664 feet), is the highest in Spain and one of the loftiest in Europe.

The Atlantic coast is steep and rocky, and in its many fiordlike indentations are good harbors. The south and east coasts, however, are comparatively regular, the gentle curves projecting in a few prominent headlands. From the Portuguese boundary to the Strait of Gibraltar, the flat coast is broken by sand dunes and wide marshes. The port of Cadiz is the only important harbor on the southern coast. At Gibraltar the coast rises to the precipitous rocky cliffs which extend almost to Cape de Palos. Here the cliffs drop to flat beaches, lifting again to the mountainous headlands at Cape Nao. These alternating stretches of low beaches and rocky cliffs follow the entire eastern coast.

Rivers and Lakes. Four of the great rivers of Spain rise in the central table-land and empty into the Atlantic. The Tagus and the Douro flow west through Portugal; the Guadiana follows a southerly course along the Portuguese boundary; the Guadalquivir flows south through the olive-clad region of Andalusia. The Ebro rises in the Cantabrian Mountains and flows east to the Mediterranean. It is the only navigable stream on the Mediterranean side. The Guadalquivir is the deepest stream of Spain, and is navigable for large vessels to Seville.

There are numerous small mountain lakes, and in the barren steppes are many salt ponds, but the only bodies of water of any size are three coast lagoons, the Albufera near Valencia, the Mar Menor of Murcia, and the Laguna de la Janda in Cadiz.

Climate. Every climate of the temperate zone is to be found in Spain. As great extremes of temperature as occur in any part of Europe are experienced in the central table-land. In this region the summers are very warm and almost rainless, especially in the Ebro valley, where the treeless sands, like a concave mirror, reflect and intensify the heat of the sun. However, nights are very cool, and sudden changes of temperature are frequent in all seasons. The winters are extremely cold, and there is skating in Madrid during two months of the year.

In Andalusia, or South Spain, there is a subtropical climate. During the mild winter vegetation is most luxuriant; the summers are very warm. The dry steppes and plains of the southeast coast are the warmest sections of the country and are frequently swept by thé "solano," a withering and scorching wind which sometimes blows for two successive weeks. The northwest provinces on the Atlantic seaboard have a climate as equable and moist as that on the western coasts of England and Scotland, and roses bloom in the gardens at Christmas time.

Agriculture. A large proportion of the inhabitants are engaged in farming, but methods of cultivation are generally crude. Although eighty-eight per cent of the land of Spain is productive, about one-half of the country remains uncultivated. In an attempt to encourage this industry, agricultural commissioners have been appointed in every province, and many agricultural institutions, including the royal school at Aranjuez, have been established. The large estates, formerly rented to tenants at high rates, are being divided and sold to the farmers with small capital.

Irrigation is necessary in the central and eastern districts and in parts of the northwestern

provinces. The two most productive regions are in Valencia and Catalonia, where the land is carefully terraced, fertilized and irrigated by a network of canals fed from reservoirs. Here all of the available land is tilled, and large crops of oranges, lemons, grapes and other fruits are produced. Rice is grown extensively in the swamps in Valencia. In the northwest provinces the land is naturally more fertile and the rain more plentiful. In this section European fruits are cultivated, and the cultivation of cereals, diversified farming and stock raising are important. In the valleys of Andalusia, olives, almonds, figs, pineapples, bananas, the date palm and some sugar cane are grown.

The most important crops of the country are wheat, barley, rye, oats, grapes and olives. Vines are grown in every province, and large quantities of wines, especially the famous Malaga and Alicante, and the sherry and tint wines from Jerez de la Frontera, as well as grapes and raisins, are exported. The olive groves embrace hundreds of square miles, and from the cities of Seville and Cordova, Spanish olives and olive oil are sent to all parts of the world. The silkworm is extensively cultivated, especially in the south. Spain is noted for its fine horses and mules and its merino sheep. Large flocks of goats, whose flesh and milk are favorite foods, are raised throughout the country.

Forests. The table-land and mountains of Central Spain are scantily supplied with trees, and in many sections the lack of timber is severely felt. The finest forests are in the West Pyrenees and Cantabrian Mountains, and the most valuable trees are the cork oak and Spanish chestnut. Cork forests are also abundant in the southern mountains. Spain's output of cork exceeds that of any other country in the world, and together with Portugal Spain produces almost three-fourths of the world's supply. The amount annually exported exceeds 78,000 tons, and comes chiefly from the districts of Seville and Barcelona.

Fisheries. Sardines are the most important product of the fisheries, and tunny fish and cod are also caught in large quantities. The value of the annual export of canned and preserved fish exceeds $5,600,000.

Minerals. The vast mineral resources of Spain are still in an early stage of development; still, no other country of Europe produces as much copper, lead and mercury and so many minerals in large amounts. Spain also ranks first in Europe in the production of salt, and it has been said that "there is enough saltpeter in Central Spain to blow up the world." Spain rivals Austria in the production of silver, most of the output coming from the province of Jaén. Lead ore is obtained here and in Murcia; copper in Huelva; iron in Biscay and Murcia; and coal mines are scattered throughout the country. The famous mercury mines of Almaden were the richest in the world until the discovery of mercury in California. These and the salt works are the only mining industries owned by the government; others are controlled by foreign companies, chiefly British. Serious strikes have recently reduced the output of the mines, but the value of the annual mineral products is about $39,000,000.

Manufactures. The northwestern provinces, being nearer to the commercial centers of Europe, have the largest manufacturing industries. The chief manufactures, cotton goods, woolens and laces, are centered in Barcelona. Linen and paper mills are also numerous in the northern provinces. The weaving of silk is growing in importance in the south. Seville produces the greatest amount of cork products, but those of superior quality are manufactured at Barcelona. Toledo is still noted for the production of fine blades and La Trubia and Oviedo for arms. There are manufactories of gloves, shoes, ropes, mercury and charcoal. Although the protected market and the recent use of electricity and the water power of the mountain streams have increased manufactures, Spain's production falls far short of its needs and possibilities.

Transportation and Commerce. Spain is reached by Western tourists by way of the grim fortress of Gibraltar or through the passes of the Pyrenees from France. There are over 9,800 miles of railroad within Spain, all owned by private companies of foreigners. The gauge differs from that of the French line, making it necessary to change trains when the frontier is reached. In 1914 the construction of a standard gauge railroad from Madrid to the French border was planned. In the larger cities electric cars and motors make their way among the mule carts and ox teams, which are still the most common "carryall" in Spain. The roads are generally poor, and transportation in the interior is inadequate to the needs of the people.

Although Spain has twenty-one seaboard provinces bordering the Atlantic and the Mediterranean, the country is not important among the commercial nations of Europe. However, in recent years the merchant marine has been increased, and foreign trade is being revived.

SPAIN

England's Rock of Gibraltar

The Escorial

The Peasant's Transportation

Peasant Costumes

A Wayside Shrine

A City Street in Old Spain

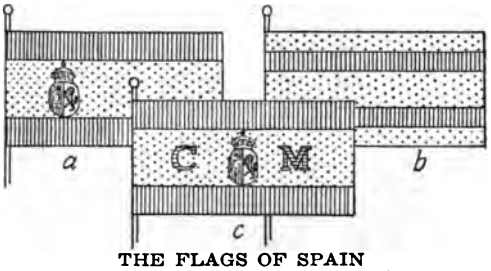
A Farmhouse in Southern Spain

The Bull Fight

Much of the trade in normal times is with Great Britain, France, the United States, Germany, Argentina and Cuba. Trade is protected by high duties, and since 1894 the United Kingdom has been the "most favored nation." In 1912 a commercial treaty with Portugal was broken, and the regular tariff rates now apply to Portuguese goods. The principal exports are wine, over 3,000,000 gallons of which go yearly to Great Britain alone, cork, metals, olives and other fruits, wool and cotton goods. Foodstuffs, live stock, machinery, coal, raw cotton and linen are imported. Bilbao and Barcelona are the chief ports.

Government and History of Spain

Army and Navy. Military service for a term of eighteen years is compulsory in Spain. There is an Aeronautical Service, consisting of balloon and aeronautic sections, attached to the military department. The reserve troops



THE FLAGS OF SPAIN
(*a*) Warship; (*b*) merchant marine; (*c*) mail.

number about 90,000 and the total strength of the field army is about 300,000 men. There are three military commissions in the colonies. The Civil Guards, numbering 20,000, and the Carabinos, or military police, preserve order throughout Spain and act as the customs guard on the frontier.

The navy has been comparatively weak, but a recent bill provides for the expenditure of about $55,000,000 for the six years following February, 1915; the program includes cruisers, destroyers, gunboats, many submarines and mines, new repair docks and works. In 1915 the navy consisted of not more than forty ships and about 15,200 sailors and marines.

Colonies. Of its once extensive colonial possessions, Spain now retains only Adrar and Rio de Oro, on the Sahara coast, Spanish Guinea, also on the west coast of Africa, and the islands of Fernando Po, Annobon and Corisco and the Elobey Islands, all in the Gulf of Guinea. The total area of these possessions is 85,814 square miles, and their population numbers 235,844. The Canary and Balearic islands are considered a part of Spain, and are under the central government. The colonial government of Spanish Guinea and of the islands in the Gulf of Guinea is centered at Fernando Po. Rio de Oro and Adrar are under the government of the Canary Islands.

Government. Spain is a constitutional monarchy. Its present constitution was adopted in 1876. The executive power is vested in the king and a council of ministers appointed by him. The monarch is inviolable, but the ministers are responsible to the Cortes and must sign all of the king's decrees. The king has power to assemble, suspend or dissolve the Cortes.

The legislative authority is vested in the king and the Cortes. The Cortes meets annually and consists of the Senate and Congress of Deputies. There are 360 Senators, eighty of whom are hereditary, 100 appointed and 180 elected. The hereditary Senators are the adult sons of the king and those of the heir, the grandees, captains-general in the army, admirals, archbishops, and the presidents of the councils of state, of the supreme tribunal, of the tribunal of accounts and of the war and navy. Half of the elective Senators retire every five years, and all retire whenever that body is dissolved by the king. The Deputies are apportioned according to population, one to every 50,000 people. Senators and Deputies have equal authority. If the Cortes is dissolved by the king, a new Cortes must assemble within three months. Since 1907 voting has been compulsory for all males over twenty-five years of age, and all such voters must be registered, possess full civil rights and must have been members of the municipality for two years.

Local Government. Each province and commune has its own elected assembly, and neither the king nor the Cortes has the right to interfere in the government of the established communes and provinces except in the protection of general or permanent interest.

The Three Conquests of Spain. This ancient country, known to the Greeks and Romans as *Hispania* or *Iberia,* and inhabited by people they called *Celtiberians,* was colonized in the twelfth century before Christ by the Phoenicians. In the third century before Christ the Greeks founded the city of Saguntum, and the Carthaginians crossed the Mediterranean to the peninsula and founded New Carthage.

The first real conquest of the peninsula was made by the Romans, when in the Second Punic War they defeated the Carthaginians and made Spain a Roman province. It became one of the most flourishing provinces of the empire and a center of Roman culture, producing many of Rome's greatest writers, including Seneca, Martial and Quintilian. During the reign of Constantine the Great, Christianity became the dominant religion.

With the fall of the Roman Empire, Spain fell under the power of the three Gothic tribes; the Vandals conquered the south, naming it Vandalusia (now Andalusia), and the Suevi and Alans settled in Galicia and Portugal. By 585 the Visigoths had subjected these invaders and had conquered the whole peninsula.

After a mastery of nearly two hundred years, they in turn were subjugated by the Moors in 712. The language and customs of the Arabs were introduced. Gorgeous palaces and fortresses, such as the Alhambra at Granada, and the magnificent Moorish cities of Cordova, Toledo and Valencia were built. The country prospered and industries advanced.

The Visigoths, driven into the north, had established the small, independent kingdoms of Leon, Navarre and Castile. Charlemagne, in the ninth century, conquered Navarre and extended his empire to the Ebro. The kingdoms of Galicia, Aragon, Murcia and Portugal had been established as the result of the division of the small kingdoms among the sons of the kings. In the thirteenth century all of these Christian principalities united against the Moors, and the Moorish princes were subjugated by Castile, one of the most powerful of the small kingdoms. The other predominant principality was Aragon, which was the first Christian state in which the people were given representation in the government.

The Union of the Independent Kingdoms. Aragon and Castile continued to develop, and in 1469, when Ferdinand V of Aragon married Isabella of Castile, these two kingdoms were united, and the fusing of the many independent states into one political unity was begun. The history of the next hundred years, during the reigns of Ferdinand and Isabella, Charles V and Philip II, is one of continued successes and added glories. Ferdinand, called "The Catholic," extended Christianity throughout the peninsula; the Moors lost their last stronghold at Granada; the discovery of America, under the patronage of Isabella, extended the kingdom abroad; Mexico, Central America, Peru, Venezuela, Chile, Cuba, Jamaica and Santo Domingo were acquired; conquests extended to Africa and to Malacca and the Spice Islands in Asia, and with the acquisition of the Philippines, the Spanish Empire girdled the globe. The European conquests included Navarre, Roussillon, Portugal, the Netherlands, Naples, Sicily, Sardinia, the Canaries and the Balearic Islands. Spain had become "the mistress of the world and queen of the ocean."

The Decline of Power. Spain's glory did not last long. In 1588 the naval supremacy of the kingdom was lost to England, when the famous Armada was shattered. In the seventeenth century, under Philip III, Philip IV and Charles II, insurrection, religious persecution and civil war weakened the kingdom. The Netherlands were lost (see NETHERLANDS, THE, subtitle *History*). At the close of the War of the Spanish Succession Spain had to give up Naples, Parma, Sardinia and Milan to Austria, Sicily to Savoy, and Gibraltar and Minorca to England.

Relations with England and France. A short period of prosperity followed, but at the close of the eighteenth century Spain unfortunately entered the war against the French republic,

THE ROYAL PALACE
As it appears to-day.

losing Santo Domingo to France. An alliance was then made with France against England, but the British victory at Trafalgar, October, 1805, permanently destroyed the Spanish naval power. Napoleon later conferred the Spanish throne upon his brother Joseph, and war with France followed. Napoleon victoriously entered Madrid, December 4, 1808. Not until 1813 were the French forces defeated and driven out of Spain by Wellington's army.

The Spanish king was restored, but the loss of the South American colonies and Mexico and oppression at home resulted in a revolution. Another revolt began in 1868, when Ferdinand's successor, Isabella II, was driven from Spain and a provisional government was established. In 1873 a republic was organized, but two years later Alfonso XII, the son of Isabella,

OUTLINE AND QUESTIONS ON SPAIN

Outline

I. Position

(1) Latitude, 36° to 44° north
(2) Longitude, 9° 15′ west to 3° 20′ east
(3) Boundaries

II. Size

(1) Actual
(2) Comparative
(3) Dependencies

III. Physical Features

(1) The great table-land
(2) Mountain ranges
  (a) Highest peaks
(3) Coastal characteristics
(4) Rivers
(5) Lakes
(6) Influence of physical features on climate

IV. Industries and Transportation

(1) Agriculture
  (a) Government encouragement
  (b) Irrigation
  (c) Chief crops
(2) Forestry
  (a) The cork industry
(3) Fisheries
(4) Mining
  (a) Vast resources
(5) Manufacturing
(6) Railroads and cart roads
(7) Trade conditions

V. The People

(1) Population
  (a) Predominance of country dwellers
(2) Racial elements
(3) National characteristics
(4) Religion and education
(5) Language and literature

VI. Government

(1) Constitutional monarchy
  (a) Executive
  (b) Legislative body
(2) Colonial government
(3) Army and navy

VII. History

(1) The early conquerors
(2) The Visigoths and the Moors
(3) Development of an independent, unified kingdom
(4) Decline of power and loss of colonies
(5) Napoleonic era
(6) Later nineteenth century
(7) Spanish-American War

Questions

In what sense may Spain be called "a country of contrasts?"

What did the Greeks call this country? What part did Rome play in its early history?

Who is the best known of Spanish writers, and for what is he famous?

Describe the processes by which the chief product of Spain's forests is secured and prepared for market.

In what sense has Spain a "responsible" government?

How does the area of the colonial possessions compare with that of Spain itself?

When and for how long was Spain a republic?

Give three causes for the decrease in population in Spain.

In what part of the country would you rather spend the winter? Why would you not care to spend the summer in the same place?

When, how and to whom did Spain lose its position as "queen of the ocean?"

What is the chief sport of the country? Why is it frowned upon by other nations? Describe it.

What part of Spain belongs to Great Britain? How long has it done so?

How did a king and queen of this country influence the history of America?

What is the Neutral Ground in Spain? What does it connect?

was made the king of a new constitutional monarchy.

Recent History. In 1886 Alfonso XIII succeeded to the throne, with Maria Christina, his mother, as regent. The cruel means employed to quell the rebellion in Cuba brought about the intervention of the United States and resulted in 1898 in the Spanish-American War, and Cuba, Porto Rico and the Philippine Islands passed under the control of the United States. In the years that followed Alfonso XIII did much to build up his exhausted country, but a grave political and economic crisis was caused by the increase in food prices resulting from the War of the Nations, which began in 1914. The country was also disturbed by strikes, chiefly among the miners and railroad employees. As a result of a general strike in July, 1916, all of Spain was placed under martial law, and there was even a more serious crisis in the summer of 1917. The country endeavored to maintain strict neutrality in the war. E.B.P.

Consult Bell's *The Magic of Spain;* How's *Sun and Shadow in Spain;* Hume's *Modern Spain.*

Related Subjects. The reader who is interested in Spain will find much information in the following articles in these volumes:

CITIES

Almeria	Madrid
Barcelona	Malaga
Bilbao	Murcia
Cadiz	Saragossa
Cartagena	Seville
Cordova	Valencia
Granada	Valladolid

HISTORY

Alfonso XIII	Iberia
Alhambra	Isabella of Castile
Alva, Duke of	Maria Christina
Armada	Moors
Castile and Aragon	Navarre
Charles V (Holy Roman Emperor)	Philip II and V
Ferdinand V	Sagasta, Praxedes Mateo
Gonsalvo de Cordova	Spanish-American War
Granada	Succession Wars
Hamilcar Barca	Torquemada, Thomas de
Hannibal	

LEADING PRODUCTS

Copper	Lead
Cork	Mercury
Fig	Sheep
Grape	Wine

MOUNTAINS

Pyrenees	Sierra Nevada

SPALDING, *spawl'ding,* JOHN LANCASTER (1840-), an American archbishop of the Roman Catholic Church, was born at Lebanon, Ky., and educated at Mount Saint Mary's College, Emmitsburg, Md., and at the University of Louvain, Belgium. He was ordained a priest in Louvain in 1863, and after studying for a year in Rome returned to the United States, where he was made secretary to the bishop of Louisville. In that city he built Saint Augustine's Church for Catholic negroes. From 1872 to 1877 he was in New York, where his unusual ability as a preacher won him considerable distinction; and in the latter year he was consecrated bishop of Peoria, Ill. Poor health compelled him to resign in 1908, and in the next year he was created archbishop.

He was prominent in educational matters, being one of the chief promoters of the Catholic University at Washington, and his intelligent interest in social and economic questions led to his appointment in 1902 as one of the arbitrators of the anthracite coal strike question. Because of two attacks of paralysis from which he did not recover fully, he laid down his duties in 1908. His published works include *Religious Mission of the Irish People, Education and the Higher Life, America and Other Poems, Socialism and Labor* and *Religion and Art and Other Essays.*

SPANIEL, *span'yel,* a group of dogs of high intelligence, consisting of field and water hunting dogs and several smaller breeds of the fancy or "toy" variety. Among the field hunters are the *Clumber, Sussex, Norfolk* and *Cocker;* the best known water spaniels are the Irish breeds. The lap spaniels include the *King Charles,* the *Blenheim* and the *Japanese.* All varieties have long bodies, drooping ears and a thick, silky coat. They show a variety of colors, including liver and white, red and white, and black and white. The spaniels are much prized because of their intelligence, beauty and gentle disposition.

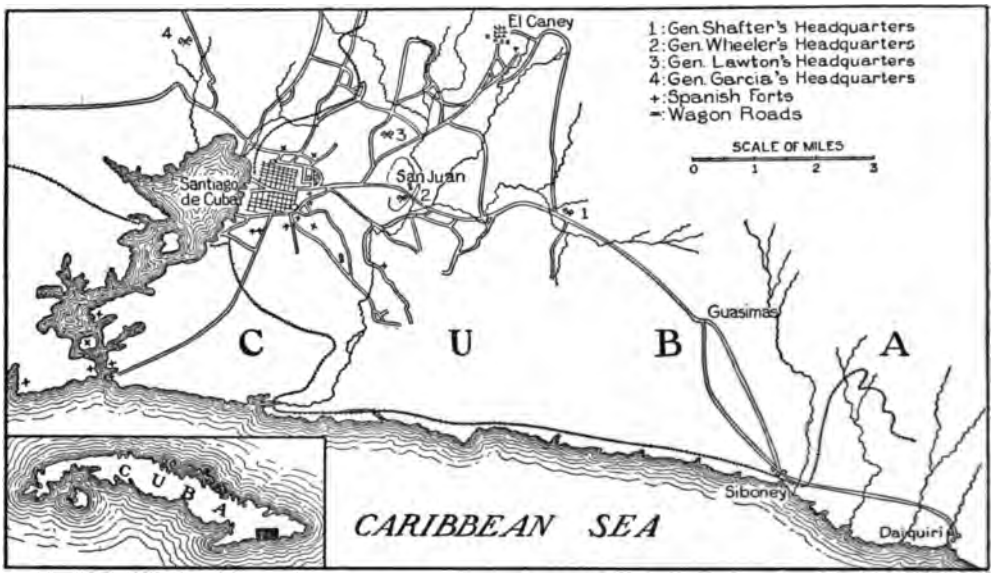
SPAN'ISH-AMER'ICAN WAR, a brief war in 1898 between Spain and the United States, but important in its effects upon the world. The contest grew out of the severity and injustice of Spanish colonial administration in Cuba. The policy of successive captains-general, intrusted with the government of the island, had for half a century alternated between ineffectual efforts at conciliation and the utmost severity. Taxes were heavy, and the island became involved in serious financial difficulties. The demand for radical reforms and a measure of self-government became more and more insistent. Revolt succeeded revolt; despotism on the one hand was matched by an-

archy on the other, culminating in 1895 in an insurrection of formidable proportions.

Extreme measures were adopted by General Weyler, the Spanish governor, against Maximo Gomez and other Cuban chiefs, who were penned in narrow parts of the island by lines of intrenchments, barbed-wire entanglements and forts, called *trochas*. Women and children and non-combatants generally were treated with great cruelty, being herded into camps and surrounded by armed guards. They were insufficiently supplied with food and were kept alive largely by assistance from the wretched people among whom they lived and by supplies sent from the United States. Reports of atrocities committed by Spanish soldiers had been frequent and had inflamed the feelings of people in the United States, already exasperated by years of misrule and anarchy almost at their doors.

President McKinley had steadily opposed recognition of the rebellion; at the same time he had affirmed the possibility of intervention, and the American attitude was naturally resented by Spain. On the night of February 15, 1898, the American battleship *Maine* was blown up in Havana harbor. Responsibility for the disaster will doubtless never be fixed, but American public sentiment accused Spanish agents, and war became inevitable. Congress formally demanded the withdrawal of Spain from Cuba, but before the message could be delivered the American ambassador at Madrid was dismissed. and the Spanish government declared war.

On April 22 Commodore Sampson, with the North Atlantic naval squadron, began a blockade of Havana and the north coast; while Commodore Dewey was ordered from his station at Hong-Kong to the Philippines, a Spanish possession. Dewey's Asiatic squadron fought the first important engagement of the war at Manila Bay, destroyed the Spanish fleet, seized Cavite and awaited the arrival of land forces to reduce Manila.



SCENE OF THE PRINCIPAL CAMPAIGN
The small corner insert shows, in its black area, the part of Cuba pictured in the large map.

Meanwhile a Spanish squadron under Admiral Cervera had reached Santiago from the Cape Verde Islands and anchored under the protection of the forts in Santiago harbor. The American forces attempted to close the channel by sinking the collier *Merrimac*, the feat of Captain Hobson, but in this they were not completely successful. Acting on orders from Madrid, Cervera attempted to run the blockade, steaming out under forced draft on the third of July. The gunfire of the Americans proved to be vastly superior to that of the enemy, and after a brief but hot running fight, the entire Spanish squadron was sunk or beached. Commodore Schley, in Sampson's absence, directed the battle. Cervera himself was wounded. A land force under Major-General Shafter had reached the island on June 21 and after defeating the Spanish at San Juan and

El Caney, had invested Santiago. On July 4 the city was called upon to surrender, but it continued to offer resistance until July 17. With its fall Spain sued for peace.

By the treaty of Paris, Spain evacuated Cuba and relinquished Porto Rico, the Philippines and Guam to the United States, in return for a generous indemnity of $20,000,000. It was expressly understood that the American interest in Cuba was to be a simple trusteeship and that a republic, guaranteed by American arms, was to be established on the island. The war cost the United States $165,000,000. The loss of life, most of which was due to disease, was 2,910 for the American forces.

Minor Incidents. Dewey's flagship, the battle cruiser *Oregon,* was ordered to join the Atlantic squadron after the Battle of Manila Bay. It made the 12,000-mile voyage around Cape Horn in marvelous time and reached Cuban waters in perfect condition, ready for duty in the line of battle.

The war fixed public attention upon Commodores Schley and Sampson, who became rivals, or were made so by their respective champions. Both were advanced to the grade of rear-admiral.

Theodore Roosevelt, second in command of the "Rough Riders," had been assistant Secretary of the Navy and a reform politician in New York state. The war focused the nation's attention upon him, and his election as governor of New York followed the same year, from which post he was chosen Vice-President of the United States, and became President upon the death of McKinley. Colonel Wood of the "Rough Riders" remained in the service and by merit rose to the command of the American army. G.B.D.

Consult Wilson's *The Downfall of Spain: Naval History of the Spanish-American War;* Sigsbee's *Story of the Maine;* Lodge's *The War with Spain.*

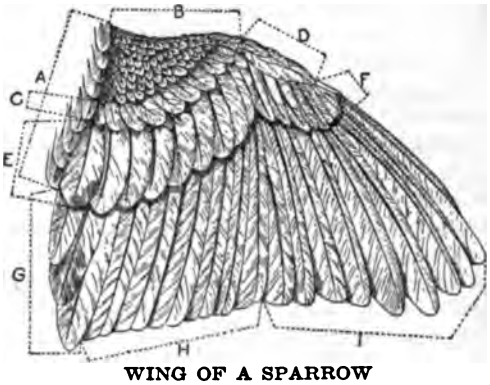
Related Subjects. Much supplementary information may be found in the following articles:

Cuba
Dewey, George
El Caney, Battle of
Hobson, Richmond P.
McKinley, William
Manila Bay, Battle of
Philippine Islands
Porto Rico
Roosevelt, Theodore
Rough Riders
Sampson, William T.
Schley, Winfield Scott
United States, subtitle *History*
Wood, Leonard

SPANISH SUCCESSION, *suk sesh'un,* WAR OF THE. See SUCCESSION WARS.

SPARKS, JARED (1789-1866), an American clergyman, historian, educator and biographer, distinguished as the pioneer in the collection of original documents relating to American history and as one of the earliest American biographers. He was born at Willington, Conn. After the completion of his theological studies at Harvard University, in 1819, he became a minister of the Unitarian Church in Baltimore. He resigned his pastorate in 1823, and from 1824 to 1831 was editor of the *North American Review.* From 1839 until 1849 he was professor of history at Harvard University, and from 1849 to 1853 he served as president of that institution. His greatest activity, however, was in the fields of biography and history. One of his best known works is his edition of the *Writings of George Washington,* in twelve volumes, the first volume of which is a biography of Washington. He also edited *The Library of American Biography,* the writings of Franklin and various collections of documents and letters. His great collection of manuscripts he bequeathed to Harvard University, and his private library was purchased by Cornell University.

SPARROW, *spair'o,* a plain-appearing song bird, with cone-shaped bill adapted to the shelling and eating of seeds, found in all parts of the world except the Australian region. Most species are migratory, those nesting in the



WING OF A SPARROW

(*a*) Scapulars
(*b*) Lesser coverts
(*c*) Middle coverts
(*d*) Ala Spuria (false wing)
(*e*) Greater coverts
(*f*) Primary coverts
(*g*) Tertiaries
(*h*) Secondaries
(*i*) Primaries

Northern United States and Canada wintering in the Gulf states. Among the best loved of American species are the *song sparrow,* with its clear, high trill; the *vesper sparrow,* with its sweet, plaintive note; and the beautiful *white-throated* and *white-crowned* sparrows. The largest of the groups is the *fox sparrow,* excepting the *Harris sparrow* of the Western prairies, a species about the same size recently discovered, having much black splashed about its head and breast. Both fox and Harris sparrows

gather in flocks on spring mornings and evenings and sing enchantingly in chorus. The *tree sparrow,* or *winter chippy,* and the *chipping sparrow* are marked with chestnut crowns. The *grasshopper sparrow* is a small ground bird with an insectlike note. The *field sparrow* frequents dry pastures and hillsides. The *seaside* and the *sharp-tailed sparrows* are found in salt marshes on the coast.

The *English,* or *house, sparrow,* a nondescript bird found about houses and villages in most parts of the Old World, was introduced into the United States in the middle of the last century and has spread with incredible rapidity to all parts of the country, driving out the native sparrows, wrens, martins, bluebirds, and even mocking birds, and replacing their songs with its continual strident chirpings. It rears three or four broods in a season, building in any available place of any available material, proving a pest about buildings, especially in eave troughs and drains. The eggs are five to seven in number, generally white in color, finely marked with olive.

Though some contend that the English sparrow is valuable in the destruction of the seeds of noxious plants, the general agreement is that we should be better off if we could exterminate the noisy little alien and invite back our former bird neighbors. M.A.H.

Consult Ridgway's *Birds of North and Middle America.*

SPARROW HAWK, the smallest of the hawks, measuring about ten inches in length. It breeds from Northern Canada to Northern Mexico, and winters in the Southern United States and south to Guatemala. Its back and shoulders are marked with reddish-brown and black, and its wings are a grayish-blue. It is commonly seen perched on dead trees, telegraph poles and other elevations, watching for its food, which consists of insects, small rodents, reptiles and sometimes smaller birds. It nests in holes in trees. The eggs are five to seven in number, creamy-white to reddish in color, marked with brown. Because of the good service it renders in destroying harmful insects and rodents, the little sparrow hawk should be encouraged and protected.

SPAR'TA, famed in Grecian history as the land of warriors and the abode of war, was the capital of Laconia, and at one time the most powerful city state in ancient Greece. It was picturesquely located in the northern part of the central plain of Laconia, about thirty miles from the Mediterranean Sea and on the right bank of the Eurotas River. Laconia was the southernmost division of that part of Greece known as the Peloponnesus (see map on page 3292). Sparta was in reality a community of five different villages having a common market place. The settlement lacked a rock citadel, such as its rival, the city of Athens, possessed in the Acropolis, but Sparta was so safeguarded from invasion by mountain barriers that it developed into a powerful state on the level plain, without even a wall about it.

Early History. According to tradition the city was founded by Lacedaemon, a son of Zeus by the mortal Taygete. The legend has it that Lacedaemon married Sparta, a daughter

LOCATION MAP

of Eurotas, and named the city for his wife. While many details of the authentic history of the settlement are unknown to us, it is generally accepted that the city was taken over by the Dorians, about 1000 B.C., when they invaded the Peloponnesus. These Dorians were the ancestors of the Spartans.

In the latter part of the ninth century a great lawgiver appeared—Lycurgus—who framed a new constitution or perhaps revised one already existing. The adoption of this constitution laid the foundations for the prosperity and growth of the Spartan state. It provided for two kings who ruled jointly, a senate of elders, twenty-eight in number, a governing board of five ephors, and a general assembly composed of all Spartan citizens over thirty years of age. Rigid military training was imposed, a system that produced men of iron nerve and women who said to their sons as they departed to battle, "Come home with your shield or upon it." This stern training deserves special description.

Training the Spartan Boy. Every Spartan belonged to the state from the time of his

birth, according to the laws of Lycurgus. When a boy was born his father was obliged to bring him before the elders to be examined. They decided whether the child should be reared or left to die. If it was robust and well proportioned they issued orders for its education, and assigned to it a certain share of land, as the Spartans were forbidden by law to engage in manufacture or trade. If, however, the child was weakly or deformed, its life was considered worthless and it was cast into a deep cavern in the mountains and left to perish.

A boy was left to the care of his parents until seven years of age, when he was enroled in a company consisting of fifteen members, all of whom were kept under the strictest discipline. From the age of seven every Spartan was compelled to take all his meals with his particular company in a public dining hall. The bravest boy in a company was made captain, and the others obeyed his commands and bore such punishments as he meted out to them.

When the boys were twelve, their undergarments were taken away, and only one outer garment a year was allowed them. Their beds consisted of the tops of reeds which were gathered with their own hands without knives. The arts of reading and writing were not considered essential, but leaping, running, wrestling and wielding a weapon with grace and accuracy were accomplishments which must be cultivated. At about the age of thirty the Spartan attained full maturity and enjoyed the rights and duties of citizenship. The sixtieth year closed the military career, and thereafter a citizen was employed either in public affairs or in the training of the young.

As a result of this system the Spartans became distinguished for the wonderful perseverance and patience with which they endured every conceivable hardship and suffering. From childhood, life was one continued trial of patience, and on certain religious occasions a boy would voluntarily ascend the altar and submit himself to the most cruel lashings. These sometimes lasted a whole day, and from them victims would frequently expire without a groan.

The Rise to Supremacy. After the organization of the state under Lycurgus Sparta gradually conquered all of Laconia. The territory known as Helos was utterly subjugated and its people were made state slaves. Another class also developed—the Perioeci ("Dwellers Around"). These were conquered people who were allowed to retain their lands and till them, but were compelled to pay tribute to the Spartans. In time of war they were forced to fight for their overlords. It is noteworthy that the Spartans, though absolute masters of Laconia, represented only a small proportion of the total population. Other conquests followed. Messenia, the most fertile district in the Peloponnesus, was subjugated between 740 and 630 B.C., and the Messenians were made serfs. By the middle of the sixth century the supremacy of Sparta was recognized throughout the Peloponnesus, and the city states in the north had begun to herald it as the leader of all Greece.

The Decline. Meantime a state beyond the Peloponnesus was rising to power—Athens—a state in which art, literature and philosophy were supreme. The Athenians joined with the Spartans in repelling the invading Persians, and Athens emerged from the struggle with enhanced prestige, eventually becoming the dominating power in Greece (see GREECE, subhead *The Persian Wars*). Athens, however, was conquered by its rival in the hard-fought Peloponnesian War, and in 404 B.C. was forced to accept a humiliating peace treaty. But the leadership claimed by Sparta was short lived. So cruelly did the Spartans rule over the other Greek states that they revolted and threw off the yoke. At the Battle of Leuctra, in 371 B.C., Sparta lost forever its claim to supremacy in Greece, and in 146 B.C. it passed with the rest of the country under the rule of Rome.

There is a modern town of Sparta near the site of the ancient city. It was laid out in 1834 and made the capital of the modern political division of Laconia. Excavations have been made on the old site, but no such interesting ruins as may be seen in Athens have been found. B.M.W.

Consult Botsford-Sihler's *Hellenic Civilization*.

Related Subjects. The reader is referred to the following articles in these volumes:

Athens	Helots
Dorians	Lycurgus
Greece, subtitle *History of Greece*	Peloponnesian War
	Peloponnesus

SPARTACUS, *spar'ta kus,* a Roman gladiator, the most famous of all time, although his glory was not achieved in the arena. He was the leader of a formidable slave rising, which nearly succeeded. Spartacus was born in Thrace, but was made prisoner by the Romans, sold as a slave, and taken for training to a gladiatorial school in Capua. With seventy comrades he escaped from the school, and de-

spite attempts of the soldiery to restrain him, established himself in the crater of Mount Vesuvius. Slaves seeking freedom flocked to him by thousands, so that he was able to overcome in battle several Roman forces that were sent against him.

Leaving his mountain fastness when he felt that his army was large enough, Spartacus succeeded in gaining possession of almost all of Southern Italy. Two consuls were sent against him, but he defeated them both and led his followers toward the Alps, meaning to lead them out of Italy, that they might be free and return to their homes. The slaves themselves, however, were determined to march on Rome, and compelled Spartacus to lead them, but they lacked courage when the critical moment arrived. A fresh army under Marcus Licinius Crassus was sent against Spartacus, and at first he defeated it as he had done before, but dissension broke out among his followers and in 71 B.C. a pitched battle resulted in the annihilation of his army. He himself, having stabbed his horse, fought on foot and showed incredible valor before he met his death. The rising practically died out with the death of the leader. See GLADIATORS.

SPAR'TANBURG, S. C., the county seat of Spartanburg County, is in the northwestern part of the state, seventy-six miles southwest of Charlotte, N. C., and 100 miles northwest of Columbia. It is on the Southern, the Carolina, Clinchfield & Ohio and the Charleston & Western Carolina railroads and on electric interurban lines. In 1910 the population was 17,517; it had increased to 21,365 (Federal estimate) in 1916. The area of the city is a little more than seven square miles. Spartanburg contains Wofford College for men and Converse College for women. Prominent features are the Federal building, city hall, Carnegie Library, Y. M. C. A. building and a $268,000 hotel. The city is in a productive cotton belt and has textile mills and fertilizer factories. The commission form of government was adopted in 1913.

SPASM, *spaz'm,* a more or less violent jerking and contortion of the muscles, is a symptom of several disorders. It is the most prominent symptom of epilepsy (which see), and is a common affliction of children suffering from intestinal trouble. It also occurs in many cases of poisoning, and is a late symptom of Bright's disease. The spasms, or "fits," that attack small children and babies should be treated as follows, according to the advice of a well-known specialist, Dr. L. E. Holt:

Keep the child perfectly quiet with ice at the head, put the feet in a mustard bath, and roll the entire body in large towels which have been dipped in mustard water (two heaping tablespoonfuls of mustard to one quart of tepid water), and have plenty of hot water and a bathtub at hand, so that the doctor can give a hot bath if he thinks it advisable.

If the convulsions have continued until the pulse is weak, the face very pale, the nails and lips blue, and the feet and hands cold, the hot bath will be useful by bringing blood to the surface and relieving the heart, lungs and brain.

The temperature should not be over 106° F.; this should always be tested by a thermometer if one can be obtained. Without this precaution, in the excitement of the moment, infants have frequently been put into baths so hot that serious and even fatal burns have been produced. If no thermometer is available the nurse may plunge her arm to the elbow into the water. It should feel warm, but not so hot as to be at all uncomfortable. One-half a teacupful of powdered mustard added to the bath often adds to its efficacy. C.B.B.

SPAV'IN, a disease of horses affecting the hock, or joint between the knee and the fetlock. It occurs in two forms, *bone spavin* and *bog spavin.* Bone spavin consists of a bony enlargement on the inside of the hock at the head of the shank bones or between the small bones of the shank. At first the spavin grows very slowly, and it may not be noticed until the horse becomes lame. No remedy has been found which will cure bone spavin, but blistering the part and allowing the animal several months rest may afford some relief. The disease is dreaded by horsemen, since it may render an otherwise perfectly sound animal nearly worthless.

Bog spavin is a soft swelling around the joint caused by the accumulation of synovial fluid (joint oil), and is usually caused by straining the joint. It is more likely to occur in young than in old horses. The treatment consists in hot applications, blistering and, as a last resort, "firing" with a hot iron, which should be done by a skilful veterinary surgeon.

SPAWN, the eggs of fishes, mollusks, frogs and reptiles, especially when found in masses. Usually they are produced in great numbers, particularly among sea animals which are preyed on by larger species or which leave eggs and young to hatch and develop alone. The production of countless millions of eggs by water-inhabiting animals is necessary to keep the different species from extinction. It is an interesting fact that fresh-water fish often deposit their eggs in the sea, while sea fish often ascend fresh-water streams during the spawn-

ing season. The collected masses of eggs of certain fish are often used in making the delicacy known as caviar.

Related Subjects. The reader is referred to the following articles in these volumes:

Caviar	Frog
Fish, subhead *Reproduction*	Salmon

SPEAKER, *speek'er,* the title of the presiding officer in the lower house of the lawmaking departments of various states and provinces. The speaker is the central figure in the United States House of Representatives, and his position in importance is deemed by many to be second only to that of President of the United States. In Canada the Speaker presides over the Dominion House of Commons at Ottawa; the presiding officer of the provincial assemblies is also given the title. The term had its origin in a custom of past centuries in Europe, when legislative bodies were addressed by the head of the government, and the presiding officer was expected to respond.

The duties of the Speaker are defined by the rules of the body which chooses him, and the dignity and character of the proceedings of the assembly are determined very largely by the ability, fairness and resoluteness of the Speaker. In most instances he has immense political power, which he too frequently uses in the interests of his party. See REPRESENTATIVES, HOUSE OF.

In the United States. The Speaker is elected by his fellow members of the House of Representatives to serve during their term of office, which is two years—the length of life of one Congress—and he retains every privilege of voting and speaking, in common with every other member. When he wishes to speak upon any measure he calls another member to the chair and takes his place upon the floor of the House. The Speaker is supposed to open and close all sessions of the House, although he may delegate the duty at any time to another member; he is responsible for maintaining order; he rules on all questions of parliamentary law and procedure, and signs all official documents of the House.

The salary of the Speaker is $12,000 a year, $4,500 more than his fellow members of Congress receive, and the same as that of the Vice-President. His powers may be limited in any session of the House, for he is controlled by the rules the majority adopts, but with thousands of bills to be presented in rapid succession, and an unwieldy assembly of 435 members, the presiding officer must be able to exercise a great deal of power, or little would be accomplished. From 1790 to 1910, the Speaker had the right to appoint all committees of the House, and to select their chairmen. As these committees practically control legislation, this appointive power gave the Speaker a vast amount of influence. On March 19, 1910, after two days of contest, closing one of the fiercest parliamentary battles in the history of Congress, the right to appoint committees was taken away from the Speaker and given to the members of the House, who thereafter determined to make committee appointments in party caucus.

The Speaker is chairman of the committee which formulates the rules of the House and can therefore practically dictate procedure. He is the head of his political party in the House, and, unlike the rule in England, seldom drops his partisanship, even in official rulings. His partisans are in a majority and his party is therefore responsible for whatever the House accomplishes; it is also charged with whatever failures there may be in carrying out a legislative program, and the Speaker largely controls both situations.

The speaker of the house in the state legislatures is an official of like power but naturally within narrower limitations. His control of legislative situations determines to a considerable degree the progress and character of lawmaking for the state. His position in the state legislature corresponds with that of the Speaker of the United States House of Representatives, before the latter was shorn of his power to appoint the committees. In the states the speaker yet makes all committee appointments.

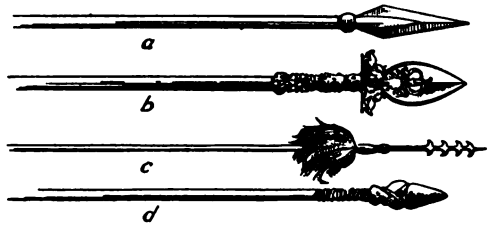
In Great Britain. In the British Parliament the Lord Chancellor acts as Speaker of the House of Lords. The Speaker of the House of Commons is always a member of that body, and is elected by the members, subject to the approval of the sovereign. There is a great difference between the power of the Speaker of the House of Representatives in the United States and that of the Speaker of the House of Commons in Great Britain. When the British Speaker takes the chair, he is expected to divest himself of all party ties and sympathies. When he dons the wig and gown of his office, he must lay aside all political preference, may express no political opinions, and must administer the same kind of impartial treatment to all members of the House. His position is one of great dignity, but carries no political power.

He never speaks in his capacity as a member of the body, and votes only in case of a tie. The symbol of his authority is the mace, which is carried before him by the sergeant-at-arms whenever he enters or leaves the House. It accompanies him on all state occasions, and stands on his table when he is in the chair. Both law and custom give the Speaker social precedence over all the commoners in the kingdom, and it is usual for the Crown to make a retiring speaker a peer, generally with the rank of viscount. His salary is £5,000 ($25,000) a year.

In Canada. See CANADA, subtitle *The Dominion Government.* E.D.F.

Consult Follett's *The Speaker of the House of Representatives;* Todd's *Parliamentary Government.*

SPEAR, *speer,* a long shaft of wood with a sharp, pointed head, usually of metal. With the exception of the club, the spear is the oldest weapon used by man. At first it was nothing more elaborate than a long, tough pole



SPEARS OF VARIOUS ERAS
(*a*) Roman; (*b*) German boar spear of the sixteenth century; (*c*) Philippine Islanders' spear; (*d*) that of the North American Indian.

sharpened at one end and hardened in the embers of a wood fire. Presently the pole acquired a head of stone, harder and sharper and more dangerous than the wooden point. Next, the spearhead was made of bronze, then of iron, and finally of steel. The poison-tipped dart of the Australian bushmen, the Filipino's barbed and feather-tufted spear, the javelins, straight and slender, that have been hurled by soldiers and hunters all over the world, the medieval knight's long lance, crested with colors, the heavy and elaborately ornamented boar spear carried by some royal sportsmen—all these are but developments of that long, tough pole with which savage man attacked an enemy.

The spear was the most important weapon of ancient and medieval armies, and thousands were used as late as the French Revolution; and, while the bayonet of the common foot soldier is all that survives to-day of the twenty-foot pike of medieval warfare, certain regiments of mounted European soldiers, such as the English Lancers, the Russian Cossacks and the German Uhlans, carry long, light spears known as lances. A.C.

SPEARMINT, *speer'mint,* a species of mint found in temperate regions in most parts of the world, which yields an oil used in the preparation of perfumes and medicine and as a flavoring in chewing gum, candies, julep, soup and sauce. The world's most important center of spearmint distilling is Saint Joseph County, Michigan, which county also produces ninety per cent of the peppermint of the United States. The plant has smooth, erect stems that grow one or two feet in height and bear at the top whorls of pale purple or white flowers. It is this species of mint which furnishes the flavoring for mint julep as well as for the sauce which flavors lamb or mutton. See MINT.

SPEARMINT
In blossom.

SPECIE, *spe'shi,* **PAYMENTS, RESUMPTION OF,** is a term which indicates the beginning of circulation of specie (metal coins), or "hard money," as it is sometimes called, after a time of suspension of its use, during which time only paper money was circulated. Such suspension has occurred a number of times in the United States.

During the War of 1812 the United States government found it necessary to borrow more money than the State banks of the country could raise. This made it very hard for the people everywhere to obtain money, and it also kept money out of the banks, because people were afraid that if they did deposit their money they could not draw it out again. The

situation was so serious that the government authorized the banks of the country to suspend the payment of specie, or coin, and to give out only paper money, called then *credit money,* and in times of stress of uncertain value. The resumption of specie payments is usually very gradual, and it requires some time for the country to recover from the financial strain of such a crisis. In the instance referred to above, resumption did not begin until 1817, and it was several years before conditions were normal. Other similar experiences occurred in 1837-1838, 1846, 1857-1858, and a later one of most far-reaching effects following the War of the Rebellion.

The Last Resumption. The United States government was compelled to finance a very expensive war from 1861 to 1865 with its treasury ill prepared. The banks of the country were obliged to suspend specie payment in the closing days of 1861, for their specie was practically exhausted. Owing to the grave political conditions of the times—war at home, and danger of a war with England—the people began to hoard their gold and silver, instead of intrusting it to the banks. But one course seemed open to the statesmen of the time, namely to issue a large volume of United States treasury notes, generally called greenbacks, and compel their circulation as money by making the people accept them in all business transactions. This gave temporary relief, and two similar issues were afterwards made, so that by the end of the war there were over four hundred million dollars of such money in the United States.

The problem then was what to do with this mass of paper money. It was at first planned gradually to retire it by paying off a few millions each month, the Secretary of the Treasury being authorized to sell government bonds and use the proceeds for this purpose. About fifty millions were thus retired. The majority of the people believed, however, that the better way was to keep this money in circulation but make it as good as gold, and the only way to do that was for the government to stand ready to pay gold for it when demanded. In 1869, Congress solemnly declared it to be the purpose of the United States to pay the greenbacks in "coin or its equivalent." Accordingly, in 1875 a bill was enacted making arrangements to "resume specie payment" January 1, 1879. The Secretary of the Treasury was authorized to sell bonds and accumulate a store of gold for the purpose of redeeming, on demand, the greenbacks. But in 1878 Congress enacted that the volume of greenbacks then in circulation —$346,681,016—should not be retired when presented for payment, but should be reissued and paid out again and kept in circulation.

Many doubted the ability of the government to resume specie payment according to promise. The Treasurer accumulated a large fund of gold, and then it was discovered that the great mass of the people had no desire to exchange greenbacks for gold. They were as good as gold simply because the government was ready to exchange gold for them. In the next twelve years only about $28,000,000 were presented for redemption. January 1, 1879, marks the resumption of specie payment by the United States, and since that time all government issues of whatever nature are on a parity with gold. W.F.Z.

Consult Sparks' *National Development;* Dewey's *Financial History of the United States.*

SPECIES, *spe'shcez,* in the classification of plants and animals, a group of individuals which reproduce their kind. All members of one species are alike in various essential particulars and show a resemblance to a common ancestor. Several species are included in a genus, and a species is in turn divided into varieties. See CLASSIFICATION, for fuller explanation.

SPECIFIC GRAVITY, *spe sif'ik grav'i ti.* See GRAVITY, SPECIFIC.

SPECTACLED, BEAR, the name given to the only species of bear found in South America, so called from the light-colored circles around its eyes. It is a native of the Chilean and Peruvian Andes, and is a small animal with smooth, shiny black fur, marked with white on the jaws, throat and chest. Very little is known of its habits. See BEAR.

SPECTACLES, *spek'ta kl'z,* the name given to an instrument or device for aiding and correcting defective sight, consisting of a pair of lenses mounted in a frame to hold them in position before the eyes. The first device of this kind was invented probably by Roger Bacon, in the thirteenth century. It was crude and clumsy and was not greatly improved until the eighteenth century, when the grinding of lenses was first based upon the principles of the refraction of light.

The lenses are made of clear or rock crystal glass and are ground to suit the defect of the eye. In cases of nearsightedness, a concave glass is used; by this means the rays of light

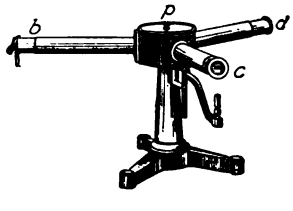
are diverged and a clear image is formed on the retina. For farsightedness, the convex lens is used, converging the light rays. The thicker the lens the greater is its magnifying power. Astigmatism, which is a structural defect of the eye, is remedied by cylindrical lenses which bring the rays of light to a common focus on the retina. The lenses are adjusted so as to make the distance of distinct vision about twelve inches from the eye.

When different lenses are needed for examining distant objects and those near the eye, *divided spectacles* are used. In these, each glass consists of two semicircles of different focal power; the lower and smaller section is used for reading and close observation and the upper section for looking at distant objects. When correctly fitted, spectacles can remedy most defects of vision, but if not exactly suited to the eye, they are injurious rather than beneficial. Therefore they should be fitted by a skilled optometrist and be changed when the eye changes. Colored glass is used in spectacles to protect the eyes from the glare of the sun.

The frame is made of tortoise shell or metal, usually gold, silver or steel. It consists of a bridge, rims, sides and bows which fit over the ears. Lenses supported on the nose by means of a spring and having no sides and bows are called *eyeglasses*. See LENS; EYE. C.B.B.

Consult Pettet's *Mechanics of Fitting Glasses;* Prentice's *Ophthalmic Lenses.*

SPECTROSCOPE, *spek'tro skohp,* an instrument for studying the spectra of bodies to determine their composition. (For a full explanation of the term *spectrum* see subhead under LIGHT, page 3425.) The simplest form of spectroscope is a triangular glass prism, and the method of using it is shown in the diagram under SPECTRUM ANALYSIS (which see). In a spectroscope of this sort the colors overlap. For the purpose of analysis it is necessary that each color be sharply defined, and this definition is secured by the use of a telescope and other tubes in connection with the prism.



SPECTROSCOPE
Explanation of the figure appears in the article.

The spectroscope in general use is shown in the accompanying diagram. It consists of a prism (*p*) enclosed in a case to which three tubes are attached. A tube (*c*), called the *collimator,* has a convex lens at the end nearest the prism and a slit at the other end. This slit is at the focus of the lens, so that the light admitted through it enters the prism in parallel rays. The slit is formed by two pieces of metal, one of which is movable and is operated by a screw with a very fine thread; thus the amount of light admitted to the prism may be carefully regulated. The colored image of the slit is magnified about eight times and is viewed through the telescope (*b*), which gives a sharply defined image. The tube *d* contains a graduated scale, the image of which is thrown upon the spectrum.

The compound spectroscope used in obtaining spectra of the heavenly bodies consists of a series of prisms arranged in the arc of a circle so that the spectrum is magnified by each before it is viewed by the observer. These spectroscopes are so constructed that they can be attached to the eyepiece of a large telescope. Astronomers measure distances and velocities of stars by means of the spectroscope. The dark lines appearing in the spectra of glowing bodies move towards one or the other end of the spectrum according as the body under investigation is approaching the observer or receding from him. Upon this principle astronomers have based some of their most remarkable discoveries. G.L.

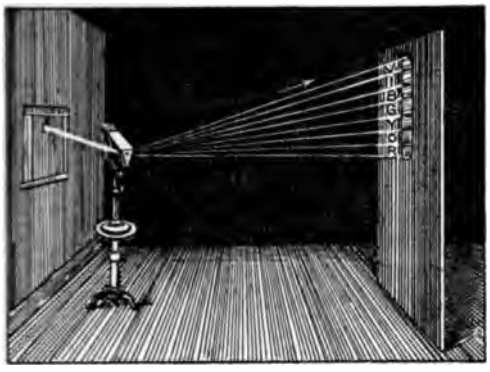
Consult Newall's *The Spectroscope and Its Work.*

SPECTRUM, *spek'trum.* See LIGHT, subhead *The Spectrum.*

SPECTRUM ANALYSIS. The effect of passing a beam of sunlight through a glass prism in a dark room is shown in the diagram on page 5489. The image of rainbow colors formed by this experiment is called the *solar spectrum* because it is produced most perfectly by sunlight, but it has been found that any glowing substance, such as molten iron or burning hydrogen, will produce a spectrum. Moreover, each substance forms a spectrum different from that of any other substance; therefore, by studying the spectrum of any substance we can learn its chemical composition. The term *spectrum analysis* is applied to this sort of study.

A spectrum that shows an unbroken array of colors from red to violet is a *continuous* spectrum, like that formed by sunlight. The spectrum formed from a single substance, like hydrogen, for instance, or that from a number of gases, is not continuous, but shows bands or lines of color separated by dark spaces, and it is known as a *bright-line spectrum.* Experi-

ment has shown that when the light of a glowing substance is passed through the vapor of another substance, this vapor absorbs the colors that appear in the spectrum of the absorbing substance, causing black lines to appear in the spectrum. A spectrum formed in this way is called an *absorption spectrum*. To illustrate, the interior of the sun is a glowing mass, but when viewed through the spectroscope, the



SPECTRUM ANALYSIS

(*v*) Violet (*y*) Yellow
(*i*) Indigo (*o*) Orange
(*b*) Blue (*r*) Red
(*g*) Green

solar spectrum contains a number of dark lines which are caused by gases that surround the heated interior of the sun and absorb the colors that they produce in the spectrum.

Fraunhofer Lines. The different colors of each substance always appear at the same place in the spectra. Consequently, when a dark line appears in place of the color that a given substance, as sodium, would produce, it proves that the light from the substance under observation is passing through the vapor of sodium. These dark lines were discovered by Fraunhofer, a Bavarian optician, and in honor of their discoverer were named *Fraunhofer lines*. The German physicist Kirchhoff concluded that these lines were caused by the presence in the sun's atmosphere of those substances which themselves produce bright lines in the same position on the spectrum. That is, the spectrum revealed the substances of which the sun was composed. Further experiments showed the planets, including the earth, and the stars to be composed of the same substances. Concerning the importance of this discovery the eminent scientist Helmholtz said:

It has excited the admiration and stimulated the fancy of men as hardly any other discovery has done, because it has permitted an insight into worlds that seemed forever veiled to us.

Uses. Spectrum analysis is employed in testing minerals for the discovery of new metals, and a number of rare metals, such as helium, have been discovered in this way. It is also employed in testing the purity of substances, since the minutest quantity of an adulterant can be detected. It is estimated that the spectroscope will detect the presence of as small a quantity as $\frac{1}{1500000}$ of a grain of lithium.

Related Subjects. The reader is referred to the following articles in these volumes:

Light, subhead *The Spectrum*
Rainbow
Spectroscope

SPEECH, the production by the vocal organs of articulate sounds for the purpose of communicating ideas. In a sense it means the same as *language,* but more accurately considered, the latter is the organized body of articulate sounds, while speech is the art of producing those sounds. Besides man, no animal so far as is known is capable of anything which may be correctly termed speech, but certain birds may be trained to imitate very closely the sounds produced by the human voice. Just how many sounds and modifications of sounds are used in the speech of mankind is not known, but scholars estimate them at approximately 1,000 in the 3,400 languages and dialects of the world. Since the vocal organs differ in their formation or development, sounds easy and natural to one body of people may be practically impossible to another, and few if any languages contain over fifty distinct sounds. See LANGUAGES OF THE WORLD.

SPEEDOMETER, *speed om' e ter,* or **CYCLOMETER,** *si klom' e ter,* a mechanical device attached to the wheel of a vehicle, indicating the distance traveled. In reality the speedometer and cyclometer, the uses of which are practically confined to bicycles and automobiles, are two different instruments, but they are closely connected in principle. The cyclometer, by a system of clockwork, set in operation by a cam on the spoke of a wheel, indicates the distance traversed. The speedometer has an extra attachment which causes the rate of speed, in miles per hour, also to be indicated on a dial.

A similar instrument is used by surveyors, and is attached to the wheel of a light vehicle, or to a wheel with a shaft or handle by which it is pushed along, each revolution causing clockwork to be set in motion. The number of revolutions is indicated on a dial, and from this, knowing the circumference of the wheel,

it is a simple matter to calculate the distance covered.

SPEKE, *speek,* JOHN HANNING (1827-1864), a famous English explorer, the discoverer of the source of the Nile River. He was born at Jordans, in Somersetshire, and entered the army when a boy of seventeen. During his service in India he explored parts of the Himalaya Mountains, crossing into Tibet, and in 1854 he went with Sir Richard Burton on his first expedition to Africa. After serving in the Crimean War he again accompanied Burton to Africa, their purpose being the exploration of the great lakes which report declared existed in the center of the continent. Lake Tanganyika was discovered, and in August, 1858, during the illness of Burton, Speke discovered the Victoria Nyanza, which he rightly considered the source of the Nile.

Burton discredited the theory, but in 1860 Speke was put in charge of an expedition for the further exploration of the Nile sources, with the result that the outlet of the lake into the river was found. Meeting Sir Samuel Baker, Speke gave him information which led to the discovery of the Albert Nyanza. His published accounts of his journeys appeared as *What Led to the Discovery of the Source of the Nile* and *Journal of the Discovery of the Source of the Nile.*

SPELLING, *spel'ing.* The ability to spell is everywhere taken for granted as one of the very basic facts of education. A man may "have no head" for mathematics; his penmanship may be almost illegible; he may have neglected literature entirely in his love for science; and yet those with whom he comes in contact may be ready enough to judge him a well-educated man. But if he misspells even those troublesome words which seem to lie in wait to catch the unwary he has proclaimed himself to his public as an uneducated man. True, such a judgment is often unjust, but it persists; and it is this tendency to judge a man's education by his spelling that gives to the subject its importance in school.

This importance has always been recognized, and a stress has been laid on the teaching of spelling which is somewhat out of proportion to its real importance in life. But the subject has always presented difficulties to such teachers as wish to make their teaching really vital. It seems a mechanical study, requiring practically no skill on the part of the teacher and furnishing little or no motive to the learner. A pupil studies his spelling lesson doggedly, as a stupid task imposed on him by authority, but it does not touch any of the interests of his life. Even the teacher who is willing to seek far afield for illuminating subject-matter—who can make a history or reading lesson as entertaining as a game—is likely to find herself baffled by the spelling lesson.

The Change in Method. There has been, however, in recent years, a decided change in the methods of teaching spelling; an organization of its facts and a relating of them to everyday concerns. The old method was comprised in the one word—drill. Lists of words, frequently unrelated, were assigned, and these the pupil muttered over to himself until he felt that sheer repetition had engraved them on his memory. The recitation consisted of the writing or spelling aloud of these words; and the teacher sometimes felt that she was imparting a touch of originality when she changed the order of the words, that the pupil might not have the mechanical assistance of an arrangement learned by heart. If pupils could not spell, their parents and even their teachers felt that what was needed was more drill.

In comparatively recent years, however, it has come to be an understood fact that drill is at the best but a clumsy tool; that a little earnest thought will take the place of a great deal of drilling.

To-day the difference is noticeable even in the assignment of the lesson. Possible mistakes are pointed out, modes of study are suggested, and devices are introduced for interesting the pupils in the derivation, meaning and proper use of words. Then, too, the spelling is kept so far as possible within the range of the pupil's interest; he is asked to spell only such words as he feels the need of knowing how to spell—only the words which are in his vocabulary. When it seems desirable to introduce new words, this is accomplished indirectly; the pupil is given the new experience, is then taught the words which describe it, and so is brought to feel, quite naturally, the necessity for learning how to spell the new words. This, of course, is the ideal method, but various modifications of it are necessary, since all pupils do not learn and use the same words at the same age and grade in school. Present-day textbooks, however, are based on the classroom experiences of many teachers, and so strike an excellent average. Each teacher, too, may supplement the textbook with grade lists, class lists and personal or individual lists, according to the needs of each pupil.

The old drill method often neglected the meanings of words; the present "thought" method lays as much stress on meaning and pronunciation as on spelling. It is not sufficient that a pupil be able to repeat glibly the definition of a new word; he must be able to use it in a sentence in such a way that it admits of no ambiguity. Each word should be made to call up as many associations in the pupils' minds as possible; in fact, spelling should become a real *word study*, and not a mere letter-by-letter study of words.

The Use of Rules. In arithmetic almost everything can be reduced to rule; in spelling comparatively few rules are possible, and these are no longer taught at the outset, as under the old method. Only when the pupils have mastered enough individual cases to make generalization seem reasonable are the rules introduced. When such derivatives as *plan, planning; compel, compelling; run, running,* have been mastered, the rule that "monosyllables and words accented on the last syllable, ending in a single consonant preceded by a single vowel, double the final consonent before a suffix beginning with a vowel" may be introduced naturally. All other rules, many of them cumbersome, are to be mastered, if at all, in about the same manner; they must follow and not precede their illustrations.

Spelling Reform

As stated in the article PHONETICS, the ideal language would be one in which every letter had but one sound and every sound was represented by a letter. In such a language each word would be spelled exactly as it sounds, and spelling would be a very simple matter once the principles of phonetics were mastered. No speech in the world to-day attains this ideal, and English comes very far short of it. One has but to consider the pronunciation of *tough, though* and *through* to be convinced of this fact.

Many scholars in England and America have from time to time voiced their dissatisfaction with the chaotic state of English spelling, and have attempted to set on foot movements for so-called spelling reform, or simplified spelling. They have always, however, met with determined opposition; for while they may have reason and logic on their side, their opponents have sentiment on theirs—the affection of men and women for the ordinary word forms which they have always used and about which their associations have grown up; and sentiment is a far harder thing to conquer than reason or logic. In recent years, however, some advance has been made in popularizing the general principles of spelling reform.

The American Philological Association and the British Philological Society made recommendations for the simplifying of a number of English words, and the National Education Association of the United States adopted in 1898 the following "reform" spellings for use in its publications:

altho	demagog	program	thorofare
catalog	pedagog	tho	thru
decalog	prolog	thoro	thruout

In 1906 there was organized in New York the Simplified Spelling Board, which was endowed by Andrew Carnegie and headed by Brander Matthews. Its simplifications were somewhat more sweeping, and were included under sixty-one rules, or recommendations. The Board recommended, for instance, such changes as the following:

1. The use of *e* instead of the diagraph *ae*, except at the end of a word; thus, *medieval* for *mediaeval; ether* for *aether.*
2. The omission of the silent *b* before *t;* thus, *dout* for *doubt; dettor* for *debtor.*
3. The use of *e* instead of *ea* in words having the short *e* sound: *hed* for *head; helth* for *health.*
4. The dropping of final *gh* when it is silent; as, *thru* for *through; tho* for *though;* and the substitution of *f* in such words as *laf* for *laugh* or *tuf* for *tough.*
5. The substitution of *er* for *re* in such words as *theater, meter* or *scepter.*
6. The omission of silent *g* and silent *k* before *n;* thus, *nat* for *gnat; naw* for *gnaw; nock* for *knock; nife* for *knife.*
7. The substitution of *f* for *ph* pronounced like *f;* thus, *fantom* for *phantom; sfere* for *sphere; trofy* for *trophy.*

A complete list of these rules cannot well be given here, but a study of the above examples will show that some of the simplified forms have already made considerable headway. *Medieval,* for instance, no longer looks strange; *theater* is commonly used; and even *tho* has come to seem fairly familiar. Some of the forms, on the other hand, are as far from acceptance as they were when first suggested, and indications are that the struggle for completely simplified spelling will be a long and hard one.

In August, 1906, President Roosevelt issued an order that reformed spelling should be used

in government publications, but this order was afterward withdrawn. A.MC C.

Spelling Reform in Canada. The spelling reform movement in Canada arose responsive to the movement in England led by phonetic scholars contemporary with Ellis and Isaac Pitman. In July, 1858, the *Phonetic Pioneer* commenced to be published as a monthly, and was devoted mainly to the propaganda of phonography of the Benn Pitman variety until the end of 1862. In 1875 the American Philological Association moved in the matter, their efforts resulting the next year in the formation of the Spelling Reform Association; and in 1883 it joined the Philological Society of London, England, in recommending simplifications of spelling under twenty-four rules.

In Canada the newspapers took up the discussion at this date, the Toronto *World* leading; and this paper is still leading in the use of good spelling in Ontario.

The Fonetic Herald was first printed in November, 1884, at Port Hope, Ont.; in 1887 it was removed to Toronto. William Houston, one of the most progressive journalists and educators of Ontario, brought the reform to the attention of the University of Toronto, of which he was not only a graduate but a distinguished lecturer; and the *Globe,* of which he was for some time an editor, has been distinguished for a conservative orthographic progressiveness among many reactionary contemporaries.

In Nova Scotia in 1885, at the request of Dr. David Allison, superintendent of education, A. H. MacKay, then principal of the Pictou Academy, brought the subject before the Provincial Education Association. When in 1891 MacKay became superintendent of education for Nova Scotia, the council of public instruction authorized the provincial examiners of teachers and high school students not to mark against candidates any improved spelling recommended jointly by the Philological Societies, by the great dictionary editors, or by standard dictionaries. This was following generally the course of the Department of Public Instruction in France, which ordered that what would appear to be accidental spelling, if in the direction of approved reform, should not be marked against candidates for promotion in any grade.

In 1906 the international Simplified Spelling Board, with headquarters at New York, was organized, consisting of representative language scholars from all parts of the English speaking world; and shortly after another international organization, known as the Simplified Spelling Society, London, England.

Webster's Dictionary popularized many improved spellings throughout the United States and Canada. But the reformers in their days of youth congealed into the conservatives of old age, so that America is becoming more stereotyped than Great Britain, and at least one province in Canada has shown reactionary progress to the movement throughout the British Empire.

In 1911 an official conference of all the education departments of the Empire was called to meet in London. The representatives were appointed by their respective governments. One of the subjects considered was the improvement and simplification of the spelling of English, and at the conclusion of the discussion the Conference unanimously adopted the following resolution:

> That this Conference is of opinion that the simplification of spelling is a matter of urgent importance in all parts of the Empire, calling for such practical steps in every country as may appear most conducive to the ultimate attainment of the end in view—the creation, in connection with the subject, of an enlightened public opinion and the direction of it to the maintenance, in its purity and simplicity among all English-speaking peoples, of the common English tongue.

After this authoritative declaration of Imperial policy, Nova Scotia, Australia and New Zealand more or less promptly introduced a first instalment of simplification in their respective education departments. The Normal College of Nova Scotia has since been publishing its annual Calendar, using the list of 3,000 simplifications, in order to acquaint teachers with the recommendations of our best scholars. The *Daily News* of Truro, N. S., has successfully adopted the same advanced degree of reform as well as the *Normal College Gazette.* Two of the most widely circulated dailies east of Montreal, *The Herald* and *The Mail,* of Halifax, have adopted over 200 words, which are gradually coming into general use in the provincial press. A.H.MC K.

Consult Michaelis and Jones's *Phonetic Dictionary of the English Language;* Althaus's *Sounds of the Mother Tongue.*

SPENCER, *spen'ser,* **HERBERT (1820-1903),** an English philosopher, whose great work was his *Synthetic Philosophy,* was born at Derby. Due to delicate health in childhood, his early education was supervised by his father, whose ideas were far in advance of the age. From

1837 to 1846 the young man was in the employ of the London & Birmingham Railway, following which he served as subeditor of the *Economist*, until 1853. This position gave him wide opportunity for studying and writing and for acquaintanceship with the brilliant people of the period, among them being George Eliot, George Henry Lewes and John Stuart Mill.

HERBERT SPENCER

While working on his *Psychology*, which appeared in 1855, he further undermined his health, and suffered for the rest of his life from chronic insomnia and dyspepsia. The great scheme of his life was the proposed publication of a complete system of philosophy, in which he aimed to outline "in a sweeping, general formula the belief in progress which pervaded his age, and to erect it into the supreme law of the universe as a whole." A complete list of the titles of this *Synthetic Philosophy*, as well as all of his writings, concludes this article.

Spencer's philosophy is chiefly occupied with defining the fields of the knowable and the unknowable. He made neither clear nor definite his expressions regarding the latter, to which, as he found, belong The Absolute, The Infinite, Space, Matter, Time, Force and Motion. What he aimed to establish was that the very fact that we cannot solve ultimate metaphysical questions compels us to admit the existence of some supreme power behind the unknowable phenomena.

His great contribution to science lay on the positive side, where he dealt with the knowable, and aimed to reduce its laws to unity. The idea of evolution he applied, first, to all forms of organic life, and then to social and political institutions. He declared knowledge is gained by twofold experience, that of the individual and that of the race; inherited intellectual tendencies, therefore, are an important determining factor. The prevailing law which governs the phenomena of nature is the persistence of force: there is continuous order in all things and a prevalent suggestion of a common origin. Hence, despite his protests, he became a materialist, explaining everything by materialism. He declared all forms of phenomena to be the result of a passing from the simple to the complex. He explained the universe as a gradual development, instead of accepting the doctrine of creationism (catastrophal or accidental development), often seeming to fail to realize that evolution may be the history of origin, but that it can never be its explanation.

Evolution is his ultimate law of nature, counteracted by one other force, that of dissolution; whether or not there is progress, depends on the relative strength of the former. The same formulas that apply to the inorganic world he also applied in explanation of the relations of all phenomena in the organic, the political, the social and the ethical worlds. Thus he combined with his idea of the persistence of force that of natural selection and adjustment to environment (see EVOLUTION).

Spencer stands as the great representative of the scientific movement of the last part of the nineteenth century. Many of his theories have been disproved by more recent investigations of specialists, but his masterly attempt to satisfy the need of a comprehensive survey of the world as a whole, in terms of facts rather than abstractions, won for him high rank among the great thinkers of all ages. To Spencer's *Synthetic Philosophy* belong the following volumes: *First Principles, The Principles of Biology, The Principles of Psychology, The Principles of Sociology* and *The Principles of Ethics.* His other works include *Essays: Scientific, Political and Speculative; Social Statics; The Study of Sociology; Education: Facts and Comments; Various Fragments; The Inadequacy of Natural Selection; Descriptive Sociology;* and his *Autobiography*, published in 1904. C.H.H.

Consult Compayré's *Herbert Spencer and Scientific Education*; Hudson's *Herbert Spencer.*

SPEN'SER, EDMUND (about 1552-1599), a great English poet of the Elizabethan Age. He was born at East Smithfield, London, was sent to the Merchant Taylors' School, then became a student at Pembroke Hall, Cambridge, and in 1576 received from the university the degree of M. A. Two years later he was taken into the household of the Earl of Leicester, and in 1579 published his *Shepheardes Calender.* This was dedicated to Sir Philip Sidney, who introduced the young poet to the court. In the next year he was made undersecretary to the lord-lieutenant of Ireland, and took part in restoring peace in that country at the time of Desmond's rebellion.

After the year 1586 he lived in Kilcolman Castle in Cork, as possessor of a large estate given him by the government. Here he continued the writing of the *Faerie Queene,* begun several years before, and upon the advice of Sir Walter Raleigh, who visited him in 1589, submitted the manuscript to the court. The only encouragement given him was a meager pension, and his *Colin Clout's Come Home Againe* shows his chagrin at his defeat. However, he published the first three books of his allegory in 1590, and they were eagerly received by the public. Somewhat later appeared a volume of short poems entitled *Complaïnts.*

EDMUND SPENSER

After his return to Ireland he married a lady whose given name, Elizabeth, alone is known. The courtship was described in the *Amoretti,* a series of sonnets, and the marriage was made memorable by the *Epithalamion,* the finest of English wedding songs. The year 1596 is notable as that in which appeared three more books of the *Faerie Queene; Foure Hymnes,* celebrating love, beauty, heavenly love and heavenly beauty, and the fine *Prothalamion.* At this time, too, was written the *Present State of Ireland,* not published for many years. All of his productions, however, did not advance him at the court, and he returned from another visit to England more discouraged than ever. Two years later his castle was broken into and burned by Irish rebels, and he narrowly escaped with his family. Not long afterward he died in a London inn.

The *Faerie Queene,* though not completed, ranks among the greatest narrative poems in the literature not only of England but of the world. It was the poet's intention to make the allegory consist of twelve books, in which twelve moral qualities should be embodied in as many knights, who should also represent some of the chief personages of the day, as Raleigh, Drake and others. However, only six books, and two cantos of *Mutabilitie* were written. The form of stanza used by Spenser has since been called by his name, and has been used by some of the greatest of English poets, as by Byron in *Childe Harold,* by Keats in the *Eve of Saint Agnes* and by Burns in the *Cotter's Saturday Night.* (See SPENSERIAN STANZA.) The music of the verse, the beauty of sentiment, and, above all, the exquisite fancies called into being by a wonderful imagination are the chief merits of Spenser's great poem. Many of the great poets who followed him have been profoundly impressed by the *Faerie Queene*—indeed, this is so true that Spenser is called "the poet's poet." A.MC C.

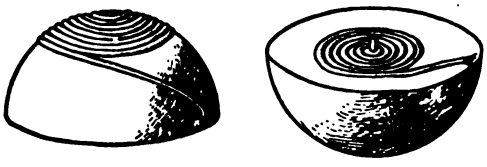
Consult Church's *Spenser,* in English Men of Letters Series.

SPENSERIAN, *spen se'ri an,* **STAN'ZA,** a verse form originated by Spenser for his *Faerie Queene.* It is a nine-line stanza, the first eight lines containing ten syllables each, the last twelve syllables, while the rhyme scheme is *ababbcbcc.* It is a very stately form of verse, and while many English poets have attempted to imitate it, few have known how to handle it in a manner worthy of its inventor. The most famous poems written in Spenserian stanza since the *Faerie Queen* are Keats's *Eve of Saint Agnes* and Byron's *Childe Harold.* It is through this last poem, probably, that most readers are familiar with its stately music and its slow movement.

SPERMACETI, *spur ma se'ti,* a waxy substance obtained from cavities in the head and blubber of the sperm whale, widely used in making ointments and facial creams. In the whale spermaceti occurs as thick, oily fluid. By a process of trying out and cooling, this fluid is separated into sperm oil and a mass of flaky white crystals. The latter constitute the spermaceti of commerce. An ordinary whale yields about twelve barrels of the raw material. When purified spermaceti is a smooth, translucent solid, practically tasteless and odorless, and similar to tallow in appearance. It can be dissolved in hot alcohol and ether, and burns with a bright flame. Though formerly employed to a considerable extent in making candles and to give weight to dress goods, it is now valued chiefly as an ingredient of ointments and cosmetics.

SPHERE, *sfeer.* A solid bounded by a curved surface, all points of which are equally distant from a point within, is called a *sphere.* The point within from which all points of the surface are equally distant is called the *center.* The distance from the center to the surface is the *radius.* The distance from any point on the surface through the center to the opposite point on the surface is the *diameter.*

Surface of Sphere. Cut a sphere into two equal parts. Wind a cord about the whole convex surface of one of the hemispheres; then wind this same cord about the entire plane surface or base of the hemisphere (which is a *great circle of the sphere*). You will find that the cord which covered the *convex* surface will cover the *great circle* twice. Stated as a rule, this is expressed: *The surface of a sphere is equal to the surface of four of its great circles.* The area of a circle equals 3.1416,



[Explanation appears in text.]

or π (pi), times the square of its radius (see CIRCLE). Therefore the surface of any sphere $=4\times\pi\times\text{radius}^2$.

What is the surface of a sphere whose diameter is 12 feet?

Surface in sq. ft. $=4\times3.1416\times6^2=452.3904$.

Volume of Sphere. Take a cylinder of the same diameter as a sphere, and of an altitude equal to the diameter of the sphere. (1) Fill the cylinder with water and in it place the sphere; hold the sphere firmly so that it rests on the base of the cylinder (does not float) and thus displaces its own volume of water. When the sphere is taken out the cylinder is found to be one-third full of water, which shows that *the volume of the sphere is two-thirds of the volume of the cylinder.*

(2) Place the sphere in the empty cylinder; fill in with salt, sugar, or sand; take out the sphere, and find that the salt, sugar or sand fills the cylinder to one-third of its height.

(3) The two solids may be made of clay or putty and weighed, and the relative weights noted.

All these experiments show that *the volume of a sphere is two-thirds the volume of a cylinder whose diameter and whose height are each equal to the diameter of the sphere.*

Volume of any cylinder = area of base × height

Volume of cylinder $=\pi\times r^2\times$ height

But in this cylinder the height is equal to diameter or twice the radius (see CYLINDER).

Volume $=\pi\times r^2\times 2r$

Volume $=2\times\pi\times r^3$

and

Volume of sphere $=\frac{2}{3}\times(2\times\pi\times r^3)$

Volume of sphere $=\frac{4}{3}\times\pi\times r^3$

Volume of sphere $=\frac{4}{3}\pi r^3$

Find the weight of a steel ball 20 inches in diameter, steel weighing 480 pounds to the cubic foot.

Volume of sphere $=\frac{4}{3}\pi r^3$

Weight in lb. $=\frac{4\times3.1416\times10^3\times480}{3\times1728}=1163\frac{5}{9}$

The surfaces of spheres are to each other as the squares of their radii. The volumes of spheres are to each other as the cubes of their radii or the cubes of their diameters. The volume of a sphere is, roughly, one-half the volume of a cube whose edge is equal to the diameter of the sphere. A.H.

SPHEROID, *sfe'roid,* a geometrical body resembling a sphere, but not perfectly round. In geometry a spheroid is a figure generated by an ellipse revolving about one of its axes. The spheroid is called *prolate,* or *oblong,* when it revolves about the longer or major axis of the generating ellipse; when it revolves about its shorter or minor axis it is said to be *oblate.* The figure of the earth is frequently referred to as an oblate spheroid, as its polar diameter is shorter than its equatorial diameter, and it is somewhat flattened at the poles. A figure generated by any axes of the ellipse other than the major or minor is called a *universal* spheroid.

SPHINX, *sfingks.* In Grecian mythology the sphinx was a wicked being usually represented as a lion, having the head of a woman, the tail of a serpent and the wings of a bird. This creature lived in a cliff just outside the city of Thebes, and kept guard over the road to the city. To every passer-by she put this riddle: What animal is it that walks on four legs in the morning, two at noon and three in the evening? And anyone who failed to answer correctly was immediately devoured. When Oedipus passed on the way to Thebes, the riddle was put to him, and without much hesitation he declared the animal to be man, who walked on his hands and feet when young, erect on his two feet in middle life, and with the aid of a staff in old age. With a howl of rage because her riddle had been read aright, the sphinx hurled herself from the rocks and was killed.

The Egyptian sphinx was not quite like the Grecian, but had the head of a man and the body, legs, feet and tail of a lion. It had no wings until a later period, when the Greek influence was felt. Originally, the sphinx was supposed to represent the god Horus, guardian of temples and tombs; and when sculptured, the face was probably made to resemble the Pharaoh who ruled at that time. Sometimes

sphinxes lined both sides of an avenue leading to a temple, as at Karnak.

The Great Sphinx now to be seen in Egypt stands close to the Great Pyramid at Gizeh; it is one of the most impressive monuments in

THE GREAT SPHINX

Egypt, and is carved out of solid rock, excepting the paws, which are built of masonry. The sands of the desert had half buried it, but they have been dug from about it, so that now the spectator looks down upon its massive paws. The great figure is 150 feet long, its head is thirty feet in length, and the width of its face is fourteen feet. These figures give some idea of its enormous size, but it is impossible to convey any idea of the expressiveness of its scarred features. The Arabs mutilated the face shamefully, using the head as a target for their guns. The age of the sphinx is unknown, but it is considered well established that it was in existence at the time of Cheops and was repaired by him earlier than 3000 B. C. A.MC C.

Consult Petrie's *History of Egypt;* Budge's *The Gods of the Egyptians.*

SPHINX MOTH, another name for the *hawk moth* (which see).

SPICE, the general name for a group of pungent and aromatic vegetable products, used chiefly to season foods. The various spices, such as pepper, nutmeg, cloves, ginger, allspice, mace, mustard, cinnamon and capsicum, are derived from different parts of plants; for example, cloves are procured from the bud, cinnamon from the bark, pepper and nutmeg from the fruit, ginger from the root, and mustard from the seed. The food value of spices arises not from their nutritive content, for their percentage of nourishment is small, but from the stimulating effect they have on the digestive organs. They should, however, be used with moderation, as excessive use of any seasoning is injurious. The cultivation of spice plants is an important industry in many tropical countries.

Related Subjects. The following spices are described in these volumes:

Allspice	Cloves
Anise	Ginger
Caper	Mustard
Caraway	Nutmeg
Cassia	Paprika
Cinnamon	Pepper

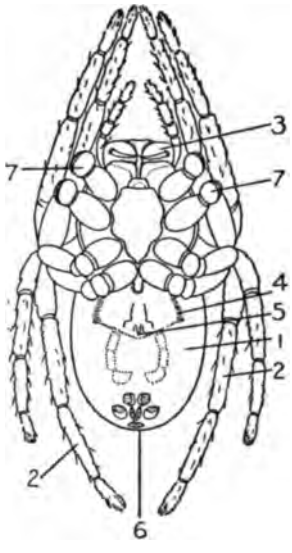
SPICE ISLANDS, a name sometimes applied to the MOLUCCAS (which see).

SPI'DER, a group of animals that are of special interest because of their ability to spin beautiful silken webs. The purpose to which some of these dainty gauze structures are put is known to every child who has learned the poem beginning—

"Will you walk into my parlor?" said the spider to the fly.
"'Tis the prettiest little parlor that ever you did spy;
The way into my parlor is up a winding stair,
And I have many curious things to show when you are there."
"Oh, no, no," said the little fly, "to ask me is in vain,
For who goes up your winding stair, can ne'er come down again."

Many an insect, however, is not so wary as the fly of the poem, and meets its death in the silken meshes.

General Description. The spider itself is not an insect, though zoölogists at one time included it among the *insecta*. According to modern classification spiders belong to a class called *arachnida* (which see), to which belong also mites, ticks and scorpions. Arachnids have two body divisions, a forepart consisting of a united head and thorax and an abdomen. In case of the spider the two parts are connected by a slender, flexible stalk. Insects have three body divisions.



EXTERNAL VIEW OF SPIDER

1. Abdomen
2. Fourth pair of legs
3. Mandible
4. Opening to breathing organ
5. Opening to reproductive organs
6. End of alimentary canal
7. Eyes

Another point of difference is the number of legs. Insects have three pairs, while spiders and nearly all other arachnids have four. The long, thin legs of a spider have seven joints, and they end in tiny claws. In some species the legs are so arranged that the animal can move in any direction—forwards, backwards and sidewise. There are two other pairs of appendages. These are in the nature of jaws, or mandibles. The first pair end in pointed fangs from which is ejected a poisonous secretion, used in killing the spider's prey. So small an amount is ejected that a human being bitten by a spider usually suffers no more discomfort than from a mosquito bite. The second pair of jaws is used in grasping and holding the spider's victim.

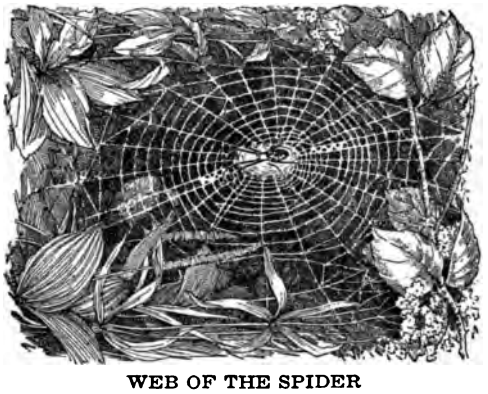
Most spiders have eight eyes, borne on the front of the head. Antennae, or feelers, are lacking. The breathing organs consist of two sacs, each containing several thin tissues arranged like the leaves of a book; slits on the underside of the abdomen open into these sacs. There are three pairs of spinnerets, small tubes borne on the end of the body. From these exudes a sticky liquid secreted by glands in the abdomen. This substance forms the silky threads of the web (see subhead below). The mouth is merely a slit, as spiders feed on blood sucked from other animals. The mouth is joined to a sucking stomach by a short tube, or oesophagus.

The Weaving of the Web. The spider does most of its spinning at night or in the early morning. It raises its spinnerets in the air and by gently pressing them against some object causes the liquid silk to flow out. The threads harden when they come in contact with the air and unite into one strand. With this thread the spider makes a suspension bridge, tightening it with its claws and firmly cementing it to a beam, leaf or wall. On several of these strands is hung the gossamer net, which is of various shapes. The web of the common house spider consists of a number of crisscross strands woven around the supporting spokes and forming an irregular wall around a central space. When any part of the web is broken the spider immediately makes repairs, but after it has spun several webs, its stock of silky fluid is for a time exhausted, and it often takes possession of the home of some other spider.

Of all the wonderful structures made by the lower animals, the orb web of the large black and yellow garden spider is the most delicately designed and skilfully made. This geometric web consists of delicate spiral strands fastened to spokes arranged like those of a wheel, and is fixed to a branch or leaf with threads resembling the ropes of a tent. The net is hung vertically, that flying insects may hit against it and be entrapped. The spider is never entangled in its own web because it runs on the

radiating strands, or spokes; the sticky, spiral threads are covered with minute, pearl-like drops of the glutinous substance to hold the captive insect firmly.

The delicate, filmy dome is another vertical web of the field and garden, and is suspended



WEB OF THE SPIDER

with the opening at the lower side. The single, shining threads which are often hung from grass stalk to grass stalk are spun by the young spiders. Sending out a thread of silk into the air, they float off with the breeze, and spinning more thread as they go, they are blown to new fields. The *flying,* or *ballooning, spiders,* thus sailing through the air, have been found in mid-ocean; it is in this way spiders are distributed over the globe.

Habits and Characteristics. There are numerous species of spiders, found all over the world, and differing considerably in habit. The largest, found in the tropical regions of South America, are two or three inches long. These creatures prey not only on insects but on humming birds. Another interesting species is the *trapdoor spider,* which makes a silk-lined burrow in the ground, and covers the entrance with a lid made of silk, leaves and soil. The *crab spider,* so-called because it can move backwards, assumes the color of the flower on which it lives, and hides in the heart of the blossom, waiting there for the unwary insect which will come in search of nectar. Another interesting group, the water spiders, build a water-tight, silken nest in the water, and inflate it by bringing down to it bubbles of air carried in the hairs on the body.

Spiders reproduce by eggs. The female, which is usually much larger than the male, makes a dainty silken cocoon for her eggs, which sometimes number many hundred. These egg cases are usually attached to the end of the mother's body. It often happens that the males are attacked and killed by their larger mates. It is usually the female that spins the web and obtains the food supply. Spider silk could be made commercially profitable for use in the textile industry if enough could be obtained. This is not possible, because any number of spiders placed together in an enclosure would eat each other up. These creatures are among the most shameless cannibals in the entire animal kingdom.

Legends of the Spider. There are many interesting stories and superstitions surrounding the spider. The lesson the patient spider taught Robert Bruce of Scotland is well known. Discouraged after six attempts to free his country from England, he was wearily watching a spider, which, after six attempts to fasten its web, in the seventh attempt succeeded. This persistence gave Bruce new courage, and he gathered together his forces and overthrew the English, making himself master of Scotland. It has since been considered a crime for anyone of the name of Bruce to injure a spider.

The old superstition that a fever could be cured by wearing a spider in a nutshell fastened around the neck is mentioned by Longfellow in the tale of *Evangeline.*

There is a pretty Greek myth explaining the spider's origin. It tells of a beautiful maiden, called Arachne, who boasted of her spinning and was punished for her pride by the jealous goddess Minerva, who changed her into a spider. B.M.W.

Consult Fabre's *Life of the Spider;* Comstock's *The Spider Book.*

Related Subjects. The reader is referred to the following articles in these volumes:

Antennae	Arachnida
Arachne	Mythology, page 4049

SPI'DER WEB, a structure spun by the spider to ensnare its enemy and protect its home. It is described in detail in the article SPIDER (which see).

SPIKE'NARD, or **NARD,** a costly perfume yielded by a plant of the valerian family, native to India. The root of the plant, which is shaped like a spike, or ear, of corn, bears at the top a cluster of thick stems about two inches long, and it is this part that is principally collected for the extraction of perfume. The precious ointment of spikenard mentioned in the Bible (see *Mark* XIV, 3-5, *John* XII, 3-5), was probably an oil or fat scented with the perfume. The odor of spikenard is not especially agreeable to people of Western countries, but those of the Orient have prized the

perfume for centuries, and the ointment was used by the Romans in connection with the bath. In Southern Canada and the Northern United States is found an aromatic herb which is used in making a tonic. This is called *American spikenard,* or *Indian root;* it is a relative of the sarsaparilla family.

SPINACH, *spin'aj,* or *spin'ech,* a popular garden vegetable cultivated for its leaves, which are cooked as greens and are also used in making soup. Though cooked spinach is nearly nine-tenths water and has only small proportions of protein, fat and carbohydrates, its delightful flavor makes it a very agreeable addition to a meal, and it is said to have slight tonic properties. This is one of the green vegetables that may be had during the entire winter, for the plant is hardy and can be grown during cold months. In the vicinity of Norfolk, Va., a tender, delicately flavored variety known as *Norfolk Savoy* is grown in large quantities for the Northern markets. Sowings are made in the fall and the crop is harvested at intervals during the cold weather. Farther north the plant is grown as an early spring crop. Spinach requires a rich soil, as plants grown in poor soil bear leaves that are tough and bitter. The seed is usually sown in drills an inch deep and a foot apart. There are two general classes: *prickly spinach,* with arrowheaded leaves and a fruit pod covered with spines; and *smooth spinach,* with round leaves and smooth fruit.

SPINACH

SPI'NAL CORD, the largest nerve trunk in the body. It is located in the spinal column, extends from the medulla oblongata to the lumbar vertebrae and is composed of gray and white matter. The spinal nerves branch off from it, and it is one of the centers of reflex action. For a full description see NERVOUS SYSTEM, subhead *Spinal Cord.*

SPINNING, *spin'ing,* an ancient household industry that has found its way into great modern factories. It is a process of making threads by twisting vegetable and animal fibers, and was originally accomplished by means of a spindle and distaff. The spindle was a stick from nine to fifteen inches long, tapering at both ends and having a notch at one end for catching the thread, and the distaff was a staff upon which the fibers were bound in a loose coil. The spinner rotated the spindle by rolling it against the thigh with the right hand, while the fibers were gathered and arranged with the left. With such a primitive device the ancient Egyptians made threads that were woven into fabrics of the finest quality. Towards the middle of the sixteenth century the progress of spinning was aided by the invention of a spinning wheel (see illustration in the article SPINNING WHEEL). This was the type of spinning machine used by the housewives of New England in colonial days, which appears so often in picture and story.

Spinning, however, was destined to undergo a complete revolution. This was the result of three notable inventions of the eighteenth century—the spinning jenny of James Hargreaves, the cotton spinning machine of Richard Arkwright and the mule spinner of Samuel Crompton. Though numerous improvements were perfected during the nineteenth century, which vastly increased the output and made possible a product of higher quality, all modern machinery is based on eighteenth-century models.

Cotton spinning as carried on in a modern factory may be taken as a type. After the raw cotton has been cleaned and arranged into laps of uniform size, it is carried to the carding machines, equipped with huge rollers covered with wire teeth, where the tangled fibers are straightened out and made to lie in straight, even rows. Then the fibers are rolled over and over one another to form *slivers,* which look like loose ropes of soft cotton yarn. A sliver goes through the processes of *drawing, slubbing* and *roving,* by which it is twisted and retwisted and made continually finer and stronger. The concluding operations are carried out in the spinning machines, in which the thread is finally given the required twist, firmness and strength.

Consult Barker's *Textiles;* Byrn's *Progress of Invention in the Nineteenth Century.*

SPINNING JENNY, *jen'i,* a device invented about 1767 by James Hargreaves, of Lancashire, England, by which sixteen or more threads could be spun simultaneously. The name *jenny* is derived from *gin,* which was the local term for *engine.* In the spinning jenny spindles were placed vertically and were rotated by a wheel worked by hand. It was found of great advantage for spinning coarse thread but unsuitable for fine work. It was replaced by the *mule,* which contained most of the important features, with improvements.

SPINNING WHEEL, the first mechanical arrangement for applying a rotary motion to a spindle for spinning cotton or flax into threads. The principle was the same as that of the spindle used by hand, but by mounting the

AN OLD SPINNING WHEEL

spindle horizontally and passing a band or small belt from a groove in the spindle over a large wheel, turning the wheel by the foot gave the spindle a more uniform motion.

The material to be spun was carried on a distaff. The wheel was turned with the left hand or foot, the material being drawn out by the right hand. The degree of fineness depended on the rapidity with which the twisting thread was drawn out. For very fine thread two spinnings were necessary. See SPINNING.

SPINOZA, *spi no' za,* BARUCH [BENEDICT] (1632-1677), a Dutch-Jewish philosopher, born in Amsterdam. His parents had fled from Catholic persecution in Portugal, and in the Netherlands he received careful instruction in Jewish theology. Under the influence of the philosophy of Descartes and Giordano Bruno, he broke with the Jewish faith, and his heretical views brought about his excommunication in 1656. He spent several years near Amsterdam, at Rhynsburg and Voorburg, finally removing to The Hague. In his insistence on maintaining a position granting absolute freedom of thought, he lived in solitude, depending on the profits from lens making, in which he was proficient, and declining both the position of professorship at the University of Heidelberg and the pension offered him by Louis XIV of France. His life was lonely, cheered only occasionally by the companionship of a few friends. The story that his days were saddened by an unsuccessful suit for the hand of the beautiful daughter of the learned physician, Van den Ende, is now generally discredited. Gentle, sensitive, heroic, with constitution weakened by consumption, he lived a life of seclusion, and in contemplation of God and spiritual realities tried to make vital and real the philosophy he taught.

His philosophy was derived from that of Descartes and developed into a complicated pantheism. It declared that God exists, and that His manifestations, or attributes, are two: extension (that is, the world of material things) and thought. It denied any causal relation between mind and matter, and so he had to apply a theory of parallelism to explain what was apparently interaction between the two. For every idea there was a physical object; for every material thing a corresponding particular idea. Though the physical and ideational causal series never interact, both are dependent on God, the Substance and Creator. Man is not free: God alone is free. That is, man is a limited manifestation of God, and God alone is Cause, Effect and Purpose. Man's attention must be riveted on the spiritual, for whenever particulars blind him and remain his ideal, harm and evil result.

His conception of God, wholly different from the Christian one, laid him open to charges of atheism. As he developed it into a philosophy it can better be described as an elaborate abstract monotheism. C.H.H.

Spinoza's occupation of lens maker should recall that in Holland the first telescope was made, and Amsterdam for many years led the world in the making of fine lenses. For a study of Spinoza's life, consult Joachim's ***A Study of the Ethics of Spinoza.***

Related Subjects. The reader is referred to the following articles in these volumes:

Atheism	Pantheism
Descartes, René	Philosophy

SPIRAEA, *spi re' a,* a genus of herbs and shrubs belonging to the rose family, widely distributed throughout temperate and cold regions of the northern hemisphere. They bear beautiful white, pink or rose-colored flowers, and many of the species are cultivated as ornamental plants. Common names of familiar species are *meadowsweet,* or *bridal wreath, dropwort, hardhack* and *willow-leaved spiraea.* Meadowsweet, a familiar garden shrub in

America, grows three or four feet high and bears slender, curving branches that in Spring are completely covered with clusters of tiny white blossoms. Willow - leaved spiraea is a popular florists' plant. It does not grow so tall as meadowsweet, and the pink or white flowers grow at the tops of the branches in large, plumelike tufts.

SPIRAEA

SPIRE, in architecture, that part of a tower or steeple which rises from the top in the form of a pyramid. (For examples, see illustration under CATHEDRAL, page 1228.) The cathedral at Cologne, Germany, has spires over 500 feet high, while the finest spire in England, that on the Salisbury Cathedral, is 406 feet in height. The general effect of a building surmounted by spires is very striking. In Milton's *Paradise Lost* these lines occur:

> The glorious temple rear'd
> Her pile, far off appearing like a mount
> Of alabaster, topt with golden spires.

SPIRITUALISM, *spir'it u al iz'm*. The term usually refers to the modern form of the belief in the survival and communication of the spirits of the departed. This grew out of certain disturbances in a house at Hydeville, N. Y., in 1848; the disturbances appeared in the presence of the two Fox sisters and consisted of raps and mysterious moving of objects. By agreeing that one rap should mean "No," and three "Yes," the knocker revealed himself, in answer to questions, as the spirit of a murdered peddler. The movement found favorable soil and grew rapidly to enormous proportions. Mediums appeared everywhere and spiritualists were numbered by the hundreds of thousands; "seances" were widely held and spread to England and the Continent, at which eager sitters sought communication with deceased relatives, and in that intercourse found a religious consolation.

The seances took the form of movements, apparently without physical contact, of table tipping and floating of objects, of communications through the medium, who was sometimes in a trance state, of spirit materializations, of writing on sealed slates, and of a variety of startling performances which one and another medium devised. Prominent in the group were the performances in a "cabinet," which the medium entered securely bound, while bells were rung, tambourines played, chairs overturned and faces appeared almost as soon as the "cabinet" doors were shut; when opened, the medium seemed as securely bound as ever. Trance mediums contributed elaborate messages describing the spirit world and proving the identity of their source, often referred to the great personages of past ages.

This bare account of the movement gives no suggestion of the intensity of the interest and the absorption in mediums and their doings, which was widespread for two or three decades. Mediums were frequently detected in frauds of the most flagrant character, and the many failures were referred to unfavorable sceptical conditions. Investigations of a more or less critical character were made from time to time; but it was not until those made under the auspices of the Seybert Commission (1888) by the Committees of the Society of Psychical Research and by investigation with a knowledge of conjuring that the fraudulent character of most of the manifestations was minutely analyzed. See PSYCHICAL RESEARCH; CONJURING.

On the other hand, these newer investigations, together with the proposal of telepathy as a possible explanation, the trance revelations (of Mrs. Piper and others) and the automatic writings of unprofessional mediums, brought the spiritualistic hypothesis again to the front. Some investigators concluded that the revelations thus emerging, so far beyond the knowledge of the mediums, and the frequency of premonitions and apparitions corresponding with the moment of death of the person communicating, all pointed to the spiritualistic as the only adequate explanation of the source of the messages.

Historically, modern spiritualism is connected with the unbroken series of "occult" interests and manifestations that stand as the heritage of magical belief and gave rise to the pseudo-sciences (see SCIENCE AND THE SCIENCES, subhead *Pseudo-Sciences*). More particularly the performances of somnambules (see HYPNOTISM) in a "mesmeric" state set the pattern for the reading of sealed messages, seeing without eyes, and similar performances which formed the stock in trade of the spiritualistic mediums. Again the table tipping and rapping

were already current (particularly in France), and were readily used for spiritualistic communication; they are examples of unconscious movements (see SUBCONSCIOUS). Finally, the apparitions, haunted houses, noisy spirits have always been reported as part of popular belief and referred to a spirit origin. Thus modern spiritualism is essentially a revival of a general belief adopting newer modes of expression (and in its most recent phases raising issues more scientifically stated), which has a long history and has served to satisfy a certain type of interest and inquiry; such interest is closely related to the "occult." The loose character of the evidence, the invitation to fraud and self-delusion, the emotional interest in the issue, the contagious spread, the attraction of such beliefs to those of unstable mental disposition —all contribute to the readiness with which the spiritualistic performances were made to support unscientific belief and to conceal true motives for its popularity.

A critical investigation of spiritualism distinguishes the physical phenomena and the spiritual or revelational. The former consist of appearances seemingly defying the laws of physics; typically, they involve the assumption that the effect could not be ascribed to the ordinary agency of the medium. There is absolutely no connection between the failure to detect the manner in which the performance (or trick) is done and the conclusion that it is to be referred to a spirit. Nothing is more constant in the annals of spiritualism than the emphatic statement of investigators that fraud was eliminated, and yet the result was shown to be nothing more than a bare-faced or shrewd trick. Mediums have made international reputations, and there have been performances heralded as marvelous and endorsed by men of great reputation and scientific distinction; yet a proper investigation readily disclosed the method.

The best known of such instances is that of Eusapia Paladino, whose performances involved nothing more than the movement of a light table or the disturbance of objects in a draped corner, while apparently her hands and feet were controlled. As a fact, she is remarkably skilful in concealing the action by which she moves table and objects and in escaping from the control of the sitters. Substantially all the authentic performances of mediums have been repeated by conjurers; while in such tricks as slate writing the whole effect depends upon the illusion of the sitter that he has had constant sight of the slates, or upon the failure to detect the substitution of a prepared slate, or upon the action of the table to serve as a screen while the message is written under the table. A piece of gauze, a low light, an expectant atmosphere and a convinced sitter will create a recognized spirit; while releases from ties and knots prove nothing but the adroitness of the medium. The vulgar atmosphere of fraud surrounding the physical performances is established. Yet they have served an educational purpose in proving how treacherous is unimpeachable evidence, how elusive fraud may become, how technical is the skill needed to discover it, how readily bias makes marvels out of plain tricks.

The revelational evidence (apart from the crude answers to questions in an ordinary seance) is of a different nature. It depends for its value upon its intrinsic character; upon the probability that the medium could not have attained it by ordinary means; upon the corroboration of the revelations. This type of evidence is difficult to estimate; the opportunities for exaggeration and delusion are subtle; more than all else, the coöperation of the medium (who may be in a trance state) is indispensable, and is not readily secured. It is the impressiveness of cumulative revelation that makes converts to the spiritualistic hypothesis of survival and communication of the departed. While leaving as open-minded a reserve as is compatible with a scientific attitude, one may yet maintain that recent studies in psychology, which prove the extreme subtlety of the mind's operations and the large part played by subconscious tendencies, will eventually account for the revelational aspect of evidence. J.J.

Consult Abbott's *Behind the Scenes with the Mediums;* Flournoy's *Spiritism and Psychology.*

Relating to Various Beliefs. The articles on the following topics, while not bearing on spiritualism, are of interest in this connection:

Alchemy	Occult
Astrology	Palmistry
Clairvoyance	Phrenology
Conjuring	Physiognomy
Demonology	Psychical Research
Divination	Psycho-Analysis
Faith Cure	Suggestion
Hypnotism	Superstition
Magic	Telepathy
Medium	Theosophy
Mesmerism	Trance
Mind Reading	Witchcraft
Necromancy	

SPIROMETER, *spi·rom'e·ter,* **a device for** measuring the capacity of the **human lungs;**

that is, the amount of air which can be expelled after a deep breath is taken. A spirometer in common use consists of two cylinders, the upper one made so as to move freely up and down when placed inverted within the other. To the upper cylinder are fastened a tube and an air cock, and the lower is filled with water. When the person under examination breathes into the tube the air is collected in the inverted cylinder and it rises in the water, the number of inches it moves being recorded on a graduated scale. From this record is computed the number of cubic inches of air expelled.

SPITHEAD, *spit'hed,* a roadstead, fourteen miles long and four miles wide, separating the Isle of Wight from the southern coast of England. It is the favorite anchorage of the British navy, and received its name from the Spit, a sandbank stretching south from the Hampshire shore for three miles. The sailors often call it "the King's bedchamber" because of the splendid protection from winds and the strong fortifications of circular towers, which were built in 1864.

SPITZ, or **POMERANIAN,** *pom er a'ni an,* **DOG,** a small dog averaging about eight pounds in weight and fourteen inches in height, having a foxlike face and sharp-pointed muzzle. The ears are erect, and the bushy tail is usually carried over the back. Its coat, beautifully soft and silky, may range in color from black through gray and red-brown to white; the pure, or white, dogs, the latter with a black-tipped nose, are considered the most desirable. In its native land, Pomerania in Prussia, the Spitz is used to tend sheep, but in America its only value is as a pet or fancy breed.

SPITZBERGEN, *spits'ber gen,* an Arctic archipelago to which no country lays definite claim, consists of five large islands—West Spitzbergen, or New Friesland, North East Land, Edge Island, Barents Island, Prince Charles Foreland—the Wiche Islands and many smaller islands. The geological formation is chiefly pre-Devonian granite, gneiss and schists. The ice- and snow-covered islands have no permanent inhabitants, their chief importance being their use as a starting point for polar exploration. It was from these islands that Andrée started in 1897 on his attempted voyage to the North Pole in a great balloon (see POLAR EXPLORATION).

Spitzbergen was discovered in 1596 by the expedition under Barents and Heemskerk, the Dutch navigators. It is the most northerly land in the world on which people can live, but is not accessible, for it is not in the lines of travel and there would be absolutely no profit in attempts to establish routes and plant colonies. However, the islands have a slightly higher winter temperature than that at Petrograd, the lowest temperatures rarely reaching —30°. Winter sets in early in September, and for four months the sun is continuously below the horizon, although for three or four hours of each twenty-four the darkness is relieved by faint twilight.

Consult Conway's *Early Voyages to Spitzbergen;* Greely's *Handbook of Polar Discovery.*

SPLEEN, the largest gland of the body not having a discharging tube. It lies below the diaphragm, to the left and a little back from the stomach (see illustration, page 7). In adults the spleen is about five inches long and three or four inches wide and weighs about seven ounces; it is soft and spongy, crumbles easily, and is a deep violet-red in color. The organ is a mass of cellular tissue covered by a fold of serous membrane from the *peritoneum,* or membrane that lines the abdominal cavity, which passes over it from the diaphragm, holding it in place.

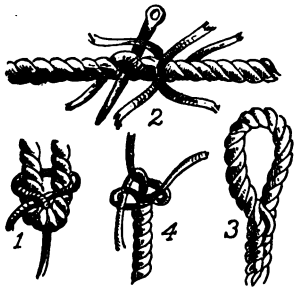
The function of the spleen is to help in the manufacture of blood, but in just what manner has not yet been determined. It can be removed completely without causing death, the other blood-manufacturing organs apparently substituting. It stores up nutritive material, forms both red and white corpuscles and is also supposed to change unknown matter into nitrogen. This organ is always enlarged during typhoid fever, possibly because it has to manufacture certain blood cells which fight and destroy disease germs, and is thus compelled to put forth additional effort. S.C.B.

SPLICING, *splys'ing,* the process of joining two rope ends without tying, by interweaving the loosened strands, which in turn are composed of yarns or fibers twisted together.

The three kinds of splices in general use are known as the *short, long* and *eye* splices. The short splice (Fig. 2) is made by placing the rope ends together in such a manner that each strand lies between corresponding strands in the second piece. The weaving of the first two is easy, but the placing of the third is more difficult; the rule is to "go over one and then under one." A long splice is not a long-woven short splice, but is made by raveling the strands back two or more feet, and then, after placing the ends together as in the short splice, con-

tinuing to displace one strand by laying the other in its place. Near the end of the strand the two are tapered, tied and the loose ends interwoven in the body of the rope.

If the rope is bent back and the end spliced into its own body, there is formed an eye or ring (Fig. 3). The method of lacing is the same as that used in making a short splice. To avoid friction that would soon wear out a rope that must bear a heavy weight, an iron thimble is often inserted in the eye splice.



SPLICING
(1) A rope end bent to form a ring, and a second rope tied or laced in; (2) short splice; (3) eye splice; (4) wall knot.

The three loose strands may themselves be intertwined in such a manner that a symmetrical knot is made at the end of the rope; this is called a single wall knot. There are few other methods of stopping a rope that are as practical (see Fig. 4).

A rope end may be bent back to form a ring or hook called a *bight,* and a second rope tied or laced in, as in Fig. 1. This is called a *becket hitch.*

SPOFFORD, *spof'erd,* AINSWORTH RAND (1825-1908), an American librarian, for many years librarian of Congress. He was born at Gilmanton, N. H., was educated by tutors, and became a bookseller and publisher in Cincinnati. From 1859 to 1861 he was associate editor of the *Daily Commercial* and in 1861 was appointed assistant librarian of Congress. Three years later he was made chief librarian, and he held this position until 1899, when he became chief assistant to Herbert Putnam, his successor. He wrote many articles on miscellaneous subjects for periodicals and edited *Library of Choice Literature; Library of Wit and Humor,* and an annual *American Almanack and Treasury of Facts, Statistical, Financial and Political.*

SPOILS SYSTEM, in politics, a system by which officeholders of all degrees of importance are dismissed after their party has been defeated in an election to make places for new appointees of the successful party. Great party leaders, with endless patronage at their command, have always rewarded their followers by giving them offices; this was true in ancient times as in modern. The only way to find enough places to supply the office-hungry partisans of a new administration is to turn out the holders, even though they are experienced and efficient. The spoils system brought inefficiency and corruption into every government in which it was ever tried.

In the United States the system found its greatest exponent in Andrew Jackson, whose friend, William L. Marcy, gave the system its name when he declared that "to the victor belong the spoils of the enemy," in politics as in war. Since the days of Jackson and Marcy, however, a feeling has arisen, not only in the United States, but in Canada, England and other countries, that governments are operated not for the financial profit of a few political leaders and their office-holding friends but for the benefit of the people. This spirit has slowly developed a new method of appointment to most of the offices in the governments of to-day, and this is described in the article CIVIL SERVICE IN THE UNITED STATES. See, also, JACKSON, ANDREW.

SPOKANE, *spo kan',* WASH., the county seat of Spokane County and the second largest city of the state, ranking next to Seattle. It is situated in the eastern part of the state, about midway between the northern and southern borders, sixteen miles west of the Idaho state line, and on the Spokane River. Seattle is 337 miles west, and Butte, Mont., is 359 miles southeast. Spokane is the greatest railway center of the Pacific Northwest, having the service of five transcontinental railroads and several other railway and electric lines; these are the Northern Pacific, the Chicago, Milwaukee & Saint Paul, the Oregon-Washington Railway & Navigation Company, the Great Northern, the Spokane & Inland Empire (electric), the Chicago, Burlington & Quincy, the Chicago & North Western, the Spokane, Portland & Seattle, the Spokane Falls & Northern, the Idaho & Washington Northern and the Washington Central. The city had a population of 104,402 in 1910; this had increased to 150,323 in 1916 (Federal estimate). The area is thirty-nine square miles.

Spokane is situated 1,900 feet above the sea; there is a magnificent view of picturesque lakes, broad, fertile valleys, and lofty mountain peaks covered with pine and evergreen forests. Through the city from east to west the Spokane River flows in a series of cascades having a total descent of 142 feet; the stream not only adds to the scenic beauty of the city, but even

at the lowest stage of water provides immense power for manufacturing purposes. At this point the river is crossed by several bridges; the one at Monroe Street, constructed at a cost of $530,000, has one of the longest single spans of concrete found in any bridge in the United States (281 feet).

Buildings and Institutions. Most of the buildings are of modern construction; the Federal building, erected in 1909 at a cost of $500,000, the city hall, the county courthouse, the Auditorium, Masonic Temple, the $2,250,000 Davenport Hotel, Elks' Lodge and the Paulsen, Old National Bank, Spokane Club and Review buildings are the most noteworthy. There are more than a hundred churches, the finest of these being the Roman Catholic and Protestant Episcopal cathedrals. Educational institutions include, besides the public schools, five parochial schools, Gonzaga University, Academy of the Holy Name, Brunot Hall for girls, Saint Stephen's School for boys and a public library containing 65,459 volumes. Saint Luke's and Sacred Heart hospitals, Saint Joseph's Orphanage, Home of the Friendless and the Deaconess Home are among the benevolent institutions. The Spokane division of the government postal inspection service is located here, and Fort Wright, a United States military post, is close to the city.

Commerce and Industry. Spokane is the commercial and industrial center of the "inland empire," a territory which embraces Eastern Washington, Northern Idaho and Western Montana. It is a region of rich mineral and agricultural resources, containing some of the largest silver-lead mines in the world, and valuable mines of gold and copper. Here the greatest area of pine timber forests in the United States is found, and crop failure in the territory is practically unknown. The region is also well adapted to stock raising (especially sheep) and dairying, and is a highly productive cereal belt, yielding large quantities of wheat. Spokane, through its shipping facilities, is the distributing point for this industrial district. One of the leading factors in the city's prosperity is vast water power, which supplies light for the city and power for the manufactories. Electric power, generated here, is transmitted to the famous Coeur d'Alene silver-lead mines a hundred miles distant. Lumber mills, flour mills, cereal food plants, sewer and water pipe works and paper mills are the largest establishments; jewelry, gloves and canned meats are also produced here.

History. Spokane is an Indian name meaning *children of the sun;* hence the city is locally referred to as *Sunny Old Spokane.* It was settled in 1872 by James N. Glover, and was originally called Spokane Falls. There were only 350 inhabitants in 1880. The next year it was incorporated as a city. It became the county seat in 1882, and the present name was adopted in 1890. The great natural resources of the region needed only the coöperation of railroads for the building of a city, and in 1883 the Northern Pacific Railroad constructed its line to this point. In August, 1889, the business section was almost completely destroyed by fire, but was quickly rebuilt. Spokane soon became a distributing center, and by 1892 eight railroads were entering the city, but the shipping facilities scarcely met requirements. Since 1884 growth has been steady and rapid. In 1910 the commission form of government was adopted. J.S.C.

Consult Powell's *Historic Towns of the Western States.*

SPONGE, *spunj,* a sea animal whose skeleton, in a certain species, gives the world its commercial sponges. People used to consider it a plant; this was perhaps due to the fact that it cannot swim, but grows attached to shells, rocks, wharves or the sea bottom. It is curious to note that when it roots in mud it develops a stem in order to keep from being smothered. Living sponges are brilliantly colored, different varieties showing various shades of red, yellow, purple, blue and green, as well as brown and gray. While they are found in practically every zone, they develop best in tropical or the warmer temperate regions. They make their homes at all depths—close to shore and as many fathoms deep as the ocean has been explored by man—and have existed in all ages, for we find sponge fossils in the oldest rock, many of them corresponding to species that are common to-day.

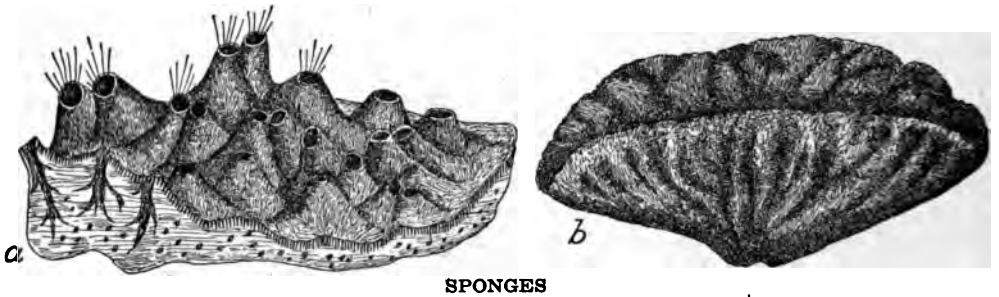
Structure. The sponge is just one step higher than the simplest form of animal life, the single cell. Beginning with a tiny egg, it develops into a soft mass of slimy flesh made up of many individual cells, all formed through the continued division of the original cell—a process called *budding.* Each of these cells is like a bit of white of egg, and the group forms a colony which is bound together and supported by a strong, fibrous skeleton. The outer membrane of the sponge is extremely porous. From this fact the family derives its special name of *Porifera*—meaning, literally, *bearing*

pores. Through these countless minute openings the sea water streams in at all points, and is carried into every part of the sponge's body by a network of canals, or tubes. If we cut through an ordinary bath sponge these branching canals can be seen very clearly in the skeleton.

In the inner membrane, along the canals, are groups of cells provided with little lashes called *flagella (fla jel' a),* which by their constant waving to and fro keep the water circulating. Thus the sponge is equipped with a perfect "irrigation system," by means of which the animal gets the food and air necessary for life; for the water brings oxygen, together with bits of plants and tiny living organisms, such as we see when we put a drop of water under the microscope. The sponge has no general stomach to digest this food; instead, each cell selects from the current whatever it needs, and as the water flows out through the large outer openings into which the canals empty it carries away all waste matter and surplus food.

Sponges take many different shapes, some ordinary and uninteresting, others most graceful and fantastic. The form depends to a large degree upon the neighborhood in which they grow, for their soft tissue is, of course, very yielding. In shallow water, where there is more or less disturbance, they are usually irregular; those which grow in deep, quiet water are, as a rule, beautifully symmetrical and often very wonderful. Some sponges are thin and flat; some grow like low bushes with wide-spreading branches; some look like fans; others resemble cups, vases, or slender cylinders. In height they range from the merest fraction of an inch to over three feet.

The Skeleton. On account of the jellylike substance of which the cells are composed, a skeleton is very necessary to support and protect the animal. In some species the skeleton looks like lime or white marble; in others it is flinty or glassy in appearance. The exquisite, lacy *Venus's flower basket,* which used to be credited to skilled Chinese or Japanese craftsmen, is nothing but the framework of a dead *glass sponge.* These lime and flint skeletons are composed of myriads of tiny bodies called *spicules,* made of a substance secreted by some of the cells. In the form of delicate threads, slender needles, or oddly-shaped crystals resembling snow crystals, these spicules intertwine to make the solid mesh of the skeleton. Sometimes they push through the tissue and cluster around the mouths of the canals, thus barring out dangerous intruders. Another protective feature of the sponge is its very disagreeable odor, suggesting garlic—a highly effective weapon for keeping at a distance fish and other sea creatures that might otherwise make a meal upon its soft substance.



SPONGES

(*a*) Exterior of a living sponge, which appears later in the stores as (*b*), the familiar bath sponge.

Besides the limy and glassy skeletons, there is a third class, characterized by elastic, horny fibers resembling silk; and it is this variety that provides the absorbent bath sponge.

The Sponge of Commerce. Sponges are gathered for trade purposes in various ways. In some localities, especially the Mediterranean Sea, where they grow in very deep water, they are collected by divers. In other places dredging is resorted to. The fisheries off the reefs of Florida use the harpoon method. Sponge-fishing crews go out in large vessels for many weeks at a time. The men are sent out from the ships in pairs, one to manage their rowboat and the other to do the actual fishing. By means of a glass-bottomed bucket the latter can see to a depth of sixty or more feet; and when he discovers a sponge of fair size he lets down his long forked pole and dextrously spears it. The sponges are spread about the deck or buried in sand until the flesh decomposes, and are then thrown into small pens filled with water, called *kraals.* From time to time they are beaten to dislodge the decayed

substance, and when thoroughly clean are strung and hung up to dry, after which they are ready for the market. Sometimes they are bleached to improve their color, but this makes them less durable.

The finest, softest sponges come from the Mediterranean, particularly from the neighborhood of Turkey; the next best grade is the Red Sea product. These foreign sponges are now scarce and command high prices. Nearly all the sponges used in the United States come from the fisheries of Florida and the Bahama Islands. The best grade of Florida sponges, called *sheep's wool,* bring from two to five dollars a pound; the ordinary *yellow sponge,* from fifty to sixty cents a pound; the very coarse *grass sponge,* from fifteen to twenty-five cents. The Florida fisheries average about 623,000 pounds yearly, valued at approximately $545,000. Although the Mediterranean fisheries produce a far smaller quantity than this, the value of their output is considerably greater on account of its superior quality. The weather has much to do with the size of the yield.

In recent years scientists have been experimenting with artificial production, since many of the richest sponge beds are now all but exhausted. The most promising method appears to be that of cutting up those sponges which are too small or irregular to be salable, and stimulating growth from these pieces, which are called *plants.* The United States government has passed special legislation to protect the Florida sponge fisheries from improper fishing methods.

During the War of the Nations there was a marked stimulation of the Florida sponge industry on the Gulf coast. This was largely the result of the difficulty of obtaining sponges from the Mediterranean beds. Tarpon Springs became the headquarters of activity, and the industry was developed chiefly by Greeks, who made use of diving apparatus instead of using the ordinary forked pole. These fearless divers are accustomed to plunging into water over 100 feet deep. Such methods enable the workers to obtain the very choicest specimens.

Fresh-Water Sponge. Although the sponge is properly a marine animal, a certain branch of the family (called *spongilla*) has adapted itself to fresh water. It is to be found in ponds, rivers and lakes in nearly all parts of the world, particularly where the water is quiet. One must look very closely to find these sponges, for they are only from half an inch to an inch long. They have the same porous, cellular bodies and supporting skeletons as their seaborn relatives, and the same habit of clinging to stones, leaves and other objects. However, they cannot boast the same vivid coloring or curious forms; they are green or grayish, and grow either in flat masses like tiny mats, or—in spots where the water is very still—as miniature bushes.

The principal difference between the marine and the fresh-water sponge is that in the latter there is provision for carrying the eggs over through the cold weather. Toward the end of the year there form within the grown sponge what are called winter buds—minute cells or eggs encased in a thick membrane, which fall to the bottom. They remain dormant until spring, and then multiply very rapidly through the process of cell division.

These fresh-water sponges are within every one's reach, and it is interesting to collect specimens in late summer, when they are fully developed, and preserve them in diluted alcohol. By studying them through even an ordinary microscope one can learn a great deal about this form of the many-celled animals. L.M.B.

Consult Moore's *Reports on Sponge Culture;* Cobb's *The Sponge Fisheries.*

SPONTANEOUS, *spon ta'ne us,* **COMBUS'TION.** See COMBUSTION, subhead *Spontaneous Combustion.*

SPONTA'NEOUS GENERA'TION, or **ABIOGENESIS,** *ab i o jen'e sis.* The theory that certain lower forms of life have sprung from substances without life is no longer held by scientists. As late as the seventeenth century, however, it was believed that life could originate from dead matter without the instrumentality of protoplasm. In no other way, for instance, could the presence of maggots on decaying meat be explained, or the formation of vegetable molds. With the perfection of the microscope and the development of the study of bacteria scientists have come to see that there is no life without antecedent life.

Related Subjects. The reader is referred to the following articles in these volumes:

Bacteria and Bacteriology	Mold
Fermentation	Protoplasm

SPOON'BILL, a wading bird, similar to the ibis, found in many parts of the globe, distinguished by its odd, spoon-shaped bill, which it swings from side to side in the water in search of shellfish, marine insects and small crabs. The most beautiful species is the *roseate spoonbill,* native to the warmer regions of the Ameri-

cas, though in Florida, where it was formerly abundant, it has been exterminated by plume hunters. The neck and the upper back of this bird are white and the rest of the plumage a rosy pink, becoming carmine on the wing coverts. It nests in colonies, returning year after year to the same locality. The nest is a platform of sticks, placed in low trees or shrubs. The eggs are five to seven in number, spotted and blotched with olive-brown.

SPORE, *spohr,* a minute body borne by lower plants, such as algae, ferns, mosses and lichens, which has the same function as a seed in higher plants—that of reproduction. Spore-producing plants, which are known as *cryptogams,* are of two kinds, those containing green coloring matter used in the manufacture of plant food (see CHLOROPHYLL), and those which must draw nourishment from other plants. It is the latter—smut on corn, cotton wilt, wheat rust, apple blight and the like—that are of special concern to the agriculturist, though there are some plants of this class that are harmless. A typical spore is a mass of protoplasm consisting of a single cell and having a nucleus and a cell wall. Many spores reproduce by cell division, but the process in higher forms of cryptogams is similar to that among the lower orders of seed-bearing plants.

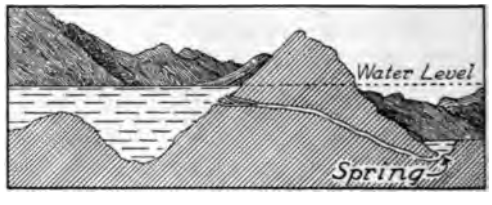
SPOTTSYLVANIA, *spot sil va'ni a,* **COURT HOUSE,** BATTLE OF, a series of battles of the War of Secession, fought in May, 1864, near Spottsylvania Court House, Va., about fifty miles from Richmond, between the Union army under Meade and the Confederate army of Northern Virginia under Lee. It was from the battle field of Spottsylvania that General Grant sent his famous message to General Halleck at Washington: "I propose to fight it out on this line if it takes all summer." After the campaign in the Wilderness, Grant began a movement toward Richmond. Lee, to check this plan, massed his army at Spottsylvania Court House before the Federal troops reached the place. There was intermittent fighting from May 7 to May 12, but the Confederates maintained their position. Both sides lost over 7,000 men. See WAR OF SECESSION.

SPRAIN, *sprayn,* a form of joint injury in which the tough, fibrous bands, or ligaments, which hold the joint in place, are torn or twisted. In a *strain* the ligaments are simply overstretched, and the injury is relieved by rubbing and rest. Sprains may occur at any joint but are most frequent at the ankle, owing to its bearing the weight of the body. Torn ligaments must be supported until they have healed. This was formerly accomplished by putting on a plaster cast, thus making it impossible to move the joint. A more modern remedy is the use of strips of adhesive plaster, which, if applied to the joint as soon as the accident occurs, or before swelling begins, form an artificial ligament. If no adhesive plaster is at hand, cold water should be used to keep down the swelling, and the joint be kept at rest until the plaster is procured. S.C.B.

SPRAT, a sea fish, one of the smallest species of the herring family, growing only about six inches long. It is often taken for young herring, but can be distinguished from the latter by the sharply-notched edge on the abdomen. Sprats live in shoals along the European Atlantic and Mediterranean coasts. They are caught in immense numbers with bag nets or seines, and make a cheap, wholesome food, being eaten fresh, smoked or pickled in brine.

SPREE, *spra,* a river of Germany which is an important route for the commerce entering and leaving the city of Berlin. The Spree rises in the kingdom of Saxony, on the boundary between that state and Bohemia, and winds its way in a northwesterly direction for 226 miles, emptying into the Havel River at Spandau, nine miles northwest of Berlin. Two canals connect it with the Oder River, and it has been deepened below Berlin to permit large vessels to enter that city. Berlin is traversed by several arms of the Spree, which divides and subdivides in its middle course to form a marshy depression known as the *Spreewald.*

SPRING. During a rainstorm a part of the water soaks into the ground and filters downward until it reaches a layer of rock or clay



THE ORIGIN OF A SPRING

through which it cannot pass. This layer may come to the surface farther down the slope, and if the water finds a channel along which it can flow it comes to the surface as a spring. Springs are most numerous in mountainous and hill regions. Sometimes they flow from crevices in the rock high up on the side of a cliff, but they are more frequently found at or near the foot of a cliff or some other slope. Some

springs are merely outlets of some underground streams, while others bubble up from a small opening. Some very large springs are the surface outlets of underground rivers. Most springs flow constantly except in seasons of severe drought, but occasionally we find those which flow periodically, sometimes at intervals of a few minutes or hours, and sometimes at longer periods. These are called *periodic* or *intermittent* springs. The flow of some of these springs is accounted for by the varying amount of water in the ground. They become active after a heavy fall of rain and usually flow during the spring, when the melting snow has saturated the ground. The flow of others is not understood.

The temperature of springs is nearly the same as that of the underground rock over which the water flows. Cool springs have deep sources, whose temperature is not affected by climatic changes. The temperature of these springs varies but little throughout the year. On the other hand, a spring whose source is near the surface will be much warmer in summer than in winter. In volcanic regions the water may come in contact with hot layers of rock, and when this occurs a hot, or thermal, spring is found.

Water, in filtering through the ground, dissolves carbonate of lime and various other minerals. Springs whose waters contain these substances in solution are known as *mineral springs*. Various gases, such as carbon dioxide, sulphureted hydrogen and nitrogen, are also found in the water of these springs. Some mineral springs have become noted health resorts because of the curative properties of their waters. Saratoga Springs, N. Y., the springs at Carlsbad, Germany, and the hot springs at Las Vegas, N. M., are good examples of such springs. W.F.R.

Consult Schlicter's *Motion of Underground Water*, in United States Geological Survey Bulletin No. 67.

Related Subjects. The reader is referred to the following articles in these volumes:

Artesian Well	Thermal Springs
Mineral Waters	Water

SPRING, that quality of a material by virtue of which it can "spring back," or resume a position from which it has been forced by tension. It is a characteristic of such materials as steel wire or rods, India rubber, whalebone or wood. The term *spring* is also applied to various devices and mechanisms.

In carriages, automobiles and other vehicles springs are used between the axles and the body of the vehicle to decrease concussion. In watches and clocks they are used to produce motion, being wound rather tightly around a central post, then gradually unwinding and imparting power to the mechanism. Springs may return to their natural position slowly, as in the case of the mainspring of a watch, or quickly, as in a gun or rifle, in which the spring is suddenly released from high tension, setting in motion the hammer, or pin, which explodes the charge. The quick action of a spring also occurs when a bow is bent and the cord is released. In the familiar spring-balance scales used in stores, the spring causes an indicator to move according to the tension. The weight of the article on the scale is ascertained, and when this is removed the spring resumes its normal position.

SPRING'BOK, or **SPRING'BUCK,** a species of South African antelope, the nearest ally of the true gazelles, so named from its habit of springing upward when alarmed or at play. Among the Dutch settlers it is known as *trek-bokken,* or *traveling buck.* Large herds travel through the country, clearing the plains of grass, and seemingly guided by instinct to seek those sections where rains have caused the vegetation to spring up again. These animals are a source of anxiety to farmers, whose flocks of sheep and goats they often kill. The springbok is exceedingly graceful, and the most slenderly built of all antelopes. Its coat is close and short, of a dull brown color, with a white stripe extending the length of the back. The horns curve in the shape of a lyre, and in the female are shorter and not so deeply ringed as in the male. The skin is valuable, and when in good condition the flesh is said to be excellent for food.

THE SPRINGBOK

SPRING'FIELD, ILL., the state capital and the county seat of Sangamon County, is centrally located in the state, 185 miles southwest of Chicago and ninety-nine miles northeast of Saint Louis. It is on the Sangamon River and on the Baltimore & Ohio Southwestern, the Chicago & Alton, the Chicago, Peoria & Saint Louis, the Cincinnati, Hamilton & Dayton, the Illinois Central and the Wabash railroads and on electric interurban lines. The population, which was 51,678 in 1910, had increased to 61,120 in 1916 (Federal estimate). The area is eight and one-half square miles.

Springfield is situated in the midst of rolling prairies, and the city is well planned. The state capitol, completed in 1887 at a cost of $4,000,000, is the most prominent feature. It is built of gray limestone and granite in classic style of architecture, and is surmounted by a massive dome (see illustration, in article ILLINOIS). Other fine public buildings are the supreme court building, Federal building, county courthouse, state arsenal, city hall, Y. M. C. A. and Y. W. C. A. buildings and the Lincoln Library. Here also are the State Library, the State Historical Library and the Supreme Court Library. Springfield is the seat of the Illinois supreme court and the United States district court. Leading institutions are the Bettie Stuart Institute, Springfield and Saint John's hospitals, two sanitariums and homes for the aged and for children. The city has 442 acres in parks, boulevards and playgrounds. The largest parks are Washington, Lincoln, Bunn and Bergen.

In Oak Ridge Cemetery is a splendid gray granite Lincoln National Monument (see illustration, ILLINOIS, opposite page 2927). The lower part is a mausoleum containing the remains of Abraham Lincoln and members of his family. In the center rises a shaft 121 feet high. At its base in front is a statue of Lincoln, and at the four corners are groups of statuary symbolizing the cavalry, navy, artillery and infantry of the United States. This monument, which cost about $350,000, contributed by people from every part of the United States, was designed by the sculptor Larkin G. Meade and was dedicated in 1874. Lincoln's old home in Springfield is owned by the state and is open to the public.

In Sangamon County are about forty coal mines, yielding an annual product worth approximately $6,500,000. In addition to large coal-mining interests, Springfield has printing and publishing houses, boiler and car works, an extensive watch factory and a large number of other manufactories. The annual value of products exceeds $11,000,000. Springfield, settled in 1819, was organized and made the county seat in 1823, and was incorporated as a town and made the state capital in 1837. It became a city in 1840. The commission plan of government was adopted in 1911, and the water and light systems are municipally owned. W.H.C.

SPRINGFIELD, MASS., the county seat of Hampden County, is in the southwestern part of the state, ninety-nine miles southwest of Boston and 103 miles southeast of Albany, N. Y. It is on the east bank of the Connecticut River, which is crossed here by several bridges, and on the Boston & Albany, the Boston & Maine, the Central New England and the New York, New Haven & Hartford railroads; it also has interurban lines. Within the city limits are included several villages, and the total area is about thirty-seven square miles. The population, which in 1910 was 88,926, had increased to 105,942 in 1916 (Federal estimate).

Springfield is an attractive city, with many fine public buildings. Chief among these is the municipal group, consisting of the Auditorium, which contains a fine pipe organ; the Administration Building and the Campanile Tower. The group cost $2,000,000, and was dedicated in 1913. Other noteworthy structures are the county courthouse, public library (and two branch libraries), Art Museum, Museum of Natural History, state armory, Federal building, the Church of the Unity and other religious edifices. Here are located the United States arsenal and armory. The arsenal was established by the Continental Congress during the War of Independence, and the armory, established in 1794, makes the largest part of small arms used by soldiers of the United States.

Forest Park (476 acres), with its fine animal and plant collections, is the principal recreation center. Several smaller parks contain fine pieces of statuary. One of the best known, *The Puritan*, by Saint Gaudens, was erected in Merrick Park, adjoining the library (see illustration, page 4874). A statue of Miles Morgan, by J. S. Hartley, and a memorial monument to soldiers and sailors of the War of Secession are in Court Square. Soldiers of the Spanish-American War are honored by a memorial monument in Carew Triangle. Hampden Park (54 acres) was once a famous race track.

The educational institutions include the training school of the International Young Men's Christian Association, the French American

College and several private schools. The leading hospitals include Wesson Memorial, Mercy, Springfield and the state hospitals. Manufacturing is the leading industry, and among the principal articles are firearms, railroad cars and supplies, confectionery, cutlery, electrical machinery, apparatus and supplies, foundry and machine shop products, and meat packing products. *Webster's International Dictionary* is published in Springfield.

William Pynchon led a party of emigrants from Roxbury, who settled here in 1636. The place was known as Agawam, after the Agawam Indians, until 1640, when it was named in honor of the English home of Pynchon. The settlement was burned by Indians during King Philip's War, and was the center of disturbance during Shays' Rebellion (which see). Springfield became a city in 1852. M.W.

Consult Barrows' *History of Springfield for the Young;* Tower's *Springfield, Past and Prospective.*

SPRINGFIELD, Mo., the county seat of Greene County, is in the southwestern part of the state, 200 miles southeast of Kansas City and 238 miles southwest of Saint Louis, on the Saint Louis & San Francisco and the Saint Louis, Iron Mountain & Southern railroads. The population, which was 35,201 in 1910, had increased to 40,341 in 1916 (Federal estimate). The area is about eight square miles. Springfield is attractively situated upon a plateau in the heart of the Ozark Mountains, at an altitude of 1,440 feet. It contains a state normal school and Drury College (Congregational), and its prominent buildings include a city hall and courthouse, erected at a cost of $250,000, a Federal building, a convention hall and a Carnegie Library.

The city has Phelps Grove, Walnut Grove, Washington and other parks, and in the vicinity are many places of scenic interest. The leading industrial plants include railroad shops, flour and lumber mills, wagon factories, machine shops and iron works. In this locality are productive lead and zinc mines. The city is an important poultry market, with annual shipments in this line amounting to approximately $8,624,000. Springfield was settled about 1819 and was incorporated as a city in 1855. The commission form of government was adopted in 1916. C.W.R.

SPRINGFIELD, Ohio, the county seat of Clark County, situated in the southwest part of the state, forty-five miles west of Columbus, the state capital. It is at the junction of Lagonda Creek and Mad River, and is served by the Cleveland, Cincinnati, Chicago & Saint Louis, the Detroit, Toledo & Ironton, the Erie, and the Pittsburgh, Cincinnati, Chicago & Saint Louis railroads; it also has an extensive system of interurban lines. In 1910 the population was 46,921; in 1916 it was 51,550 (Federal estimate). The area exceeds eleven square miles.

Springfield is the seat of Wittenberg College (Lutheran), Springfield Seminary and of many private schools. The city's more prominent features are a Federal building, erected in 1890 at a cost of $150,000, a handsome county courthouse and county office building, which together cost $200,000, a city hall, built at a cost of $250,000, and containing the city market and auditorium, Warder Public Library, Y. M. C. A. building, the state fraternal homes of the Masons, the Independent Order of Odd Fellows and the Knights of Pythias, and the Lagonda Club. The railroad stations are worthy of note, as are also a number of fine churches. In front of the city hall are the Kelly fountain and esplanade. Snyder Park, the largest of the city's playgrounds, contains 217 acres, beautified by landscape gardening; over the entrance is a memorial arch, erected by citizens to the memory of the donors of the park. The city hospital is finely equipped.

Power for manufacture is supplied by Lagonda Creek and Mad River, and in the vicinity natural gas is found. The leading products are various kinds of harvesting machinery and other agricultural implements, structural iron, windmills, engines, electric motors, undertakers' supplies and gristmill products.

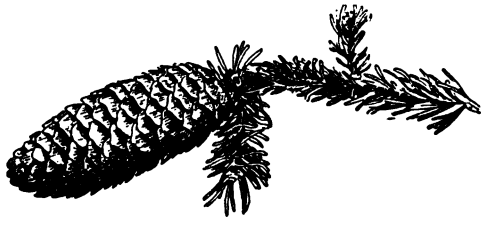
SPRING HILL, a town in Cumberland County, Nova Scotia, in the northwest part of the province. It is on the Cumberland Railway & Coal Company's line, twenty-seven miles north of Parrsboro and five miles south of Spring Hill Junction, where connection is made with the Intercolonial. Spring Hill Junction is seventeen miles south of Amherst and sixty miles northwest of Truro. The town of Spring Hill is the distributing center of a coal-mining district, and itself has several small mines. Population in 1911, 5,713.

SPROULE, *sproul,* Thomas Simpson (1843-), a Canadian physician and statesman, for more than a quarter of a century a Conservative member of the Dominion House of Commons. Sproule is also one of the leaders of the Orangemen; he was grand master of the Loyal Orange Association of British North America from 1901 to 1911, and in the latter

year was chosen president of the Imperial Grand Orange Council of the World.

Sproule was born in York County, Ont. He attended the University of Michigan, and later was graduated in medicine from Victoria University, Cobourg. He spent a few years in Michigan in the practice of medicine, but then returned to Canada and entered political life. From 1878 to 1915 he was a member of the House of Commons, for the last four years being Speaker. In December, 1915, he was called to the Senate. Sproule held strong views in favor of Protestant supremacy in Canada.

SPRUCE, *sproos,* a group of cone-bearing evergreen trees, closely related to the pines. There are about thirty species, all native to the northern hemisphere. Their northern limit is beyond the Arctic Circle, their southern, the



CONE OF WHITE SPRUCE

European Pyrenees, the Himalayas of Asia and, in North America, North Carolina and Arizona. Spruces have tall, tapering trunks with slender, horizontal branches, and their leaves, which are stiff and pointed, are set on woody projections. Their fruit is a woody cone.

The *Norway,* one of the ornamental species, is the most widely distributed and the most important European spruce. It is extensively planted because it grows rapidly and the wood is valuable as lumber. The mature trees are 150 feet high. Resin and turpentine are obtained from the wood, and the bark yields tannin, which is used in tanning leather.

The *white* and the *black* spruces are the most widely distributed of the North American spruces. The names denote the general tone of bark and foliage. The white spruce ranges north to Bering Strait and south to Michigan and Wisconsin. Its lumber is used for interior finishing and general building. However, the greatest value of its wood, together with that of the black spruce, is in paper manufacture. These two spruces, the black having a more confined range than the white, supply the largest amount of wood pulp for this purpose (see PAPER). From the resin of black spruce chewing gum is manufactured.

The *Engelmann* spruce, the white spruce of the Rocky Mountains and the Cascade Range, is a fine tree reaching a height of 150 feet. With the pines, it knows the mysteries of mountain solitudes, living in altitudes nearly two miles above the sea. The lumber is exceedingly valuable, but generally inaccessible.

The *Sitka* spruce, large forests of which are found in the swamps of the tidewater regions of Western United States and on the seaward slopes of the Alaskan mountains, is another important lumber tree. The *Douglas* spruce, called *Oregon pine* and *Douglas fir,* is, after the majestic sequoia, the highest tree of America, and the longest timbers cut are from its straight shaft. Its range covers 1,000,000 square miles, from California and the damp regions of the Pacific coast to Alaska. See SEQUOIA. M.W.

SPURGE FAMILY, or **EUPHORBIACEAE,** *u fawr be a'se ee,* a group of herbs, shrubs and trees comprising about 4,000 species, many of which are the source of very useful products. Castor oil and croton oil, cassava and rubber are among these products. The family includes also several ornamental plants, among them the poinsettia. Members of the spurge group bear small, inconspicuous flowers, but these sometimes have bracts (see BRACT) of very brilliant hues. A biting, milky juice is a common characteristic of the plants. In Africa there are several species that can with difficulty be distinguished from cacti when not in bloom. The group is widely distributed in temperate and tropical regions.

Related Subjects. For other details the reader is referred to the following articles in these volumes:

Cassava
Castor Oil
Poinsettia
Rubber and Rubber Manufacture

SPURGEON, CHARLES HADDON (1834-1892), one of the best known English preachers of the later nineteenth century. He was born at Kelvedon, in Essex, studied at Colchester and at Maidstone, and by the time he was fifteen years old had become usher in a school at Newmarket. Meanwhile he had joined the Baptist Church, and had begun to preach in and near Cambridge; his youthfulness attracted large audiences and a display of vigorous independence of thought succeeded in holding them. In 1854 he was made pastor of the Baptist chapel in New Park Street, London, and proved so popular that a larger building was demanded almost immediately. The great Metropolitan Tabernacle, which could seat 6,000 people, was

opened in 1861, and there he preached for the rest of his life, continuing always to attract great congregations.

His sermons, marked by a simple yet forceful style, intense earnestness and unfailing humor, were published each week, and reached all English-speaking countries. He also wrote *The Saint and His Saviour, John Ploughman's Talks, The Treasury of David, Types and Emblems* and *The Present Truth*, and edited a monthly magazine, *Sword and Trowel*. Out of his work at the Tabernacle there grew a system of schools and almshouses, a pastor's college, the Golden Lane Mission and the Stockwell Orphanage.

CHARLES H. SPURGEON
Probably no more famous preacher has lived in modern times.

The best life of Spurgeon is that by Shindler, published in 1892.

SPY, in military usage, a term defining any person who, while not wearing the uniform or distinctive badge of his service, mingles with the enemy to obtain information of value to the army he is serving. It is clearly agreed in international warfare that a soldier in uniform, no matter under what circumstances he is taken, cannot be considered a spy. To be condemned as a spy a person must actually be taken within the lines of the enemy, in disguise, or pretending to be other than he really is. Civilians openly carrying messages are not spies, and are not subject to the ignoble death meted out to those who have laid aside their uniform in the endeavor to penetrate the enemies' lines. Aviators and balloonists who reconnoiter or "spy out" the position of forces are not spies. A spy is one who acts clandestinely or under false pretenses.

Even a spy must receive trial before punishment. An ignoble death, by hanging or shooting, is prescribed in usages of war for all condemned spies. As an illustration of the status of a spy the celebrated case of Major André, hanged in 1780, affords a striking example. He was caught within the lines of the United States army, in disguise. Not being in uniform, he was not entitled to the treatment due to an honorable combatant. He was a spy. Had he reached the British lines and afterwards been captured, although known once to have acted as a spy, he must then have been treated simply as any other prisoner of war.

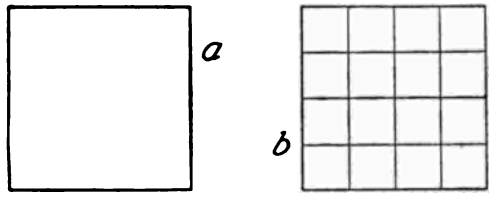
The term spy is also applied in time of peace to those who try to collect information in one country which then or at any other time would be valuable to another country. Special laws deal with such cases.

See HALE, NATHAN, for history of a devoted man who sacrificed his life as a spy.

SQUADRON, *skwad'run*, a naval and military term describing a division of a regiment of cavalry or fleet of ships. In the United States army a squadron is commanded by a major and consists of from 120 to 200 men, divided into three troops. A naval squadron may consist of a number of from two to eight war vessels, under the command of a junior flag officer.

SQUARE, a plane figure bounded by four equal straight lines and having four right angles (see *a* in diagram).

The number of square units in a square is the product of the number of units in the length and the number of units in the width, as in any rectangle. But since the length and width of a square are equal, the area is found by multiplying one side by itself, or by squaring one side. The square of a number is indicated by placing the exponent 2 to the right and above the figure denoting the number to be squared; thus, $4^2=4\times4$ or 16. In *b* of the accompanying illustration we have a square whose sides are each four units in length. The area is therefore 4×4, or 16, square units.



SQUARES
Explanation of figures appears in the text.

What is the area of a square city block 600 feet long?

One side = 600 ft.
Area in sq. ft. = 600^2 = 360000

When the area of a square is known, one side may be found.

What is the side of a square whose area is 144 square feet?

The problem becomes: What number multiplied by itself gives 144? It is expressed thus:

$\sqrt{144}=?$ The answer, or 12, is called the *square root* of 144. The problem is expressed thus:

Area of square = 144 sq. ft.
1 side in ft. = $\sqrt{144}=12$

The *line* upon which a square is built is called the *root* of the square.

Related Subjects. In connection with this discussion of the square, the reader is referred to the following articles in these volumes:

Mensuration	Square Measure
Quadrilateral	Square Root
Rectangle	

SQUARE MEASURE, the system used in the measurement of surfaces. The name is taken from that of the square, or the unit employed in finding the *area* of a surface. The table of common square measure is given in these volumes on page 1763, under the title DENOMINATE NUMBERS. For practical applications of the principles of square measure, see MENSURATION.

SQUARE ROOT. On a line 4 inches long build a square. The area of the square is 16 square inches. On a line 9 feet long build a square. The area of the square is 81 square feet. On a line 8 units long build a square. The area is 64 square units.

The drawing of many squares on cross-section paper, as suggested above, shows the meaning of a square, and makes clear the relation of the area of a square to one of its sides; namely, *the number of square units in the area is equal to the number of units in one side multiplied by itself.* This product is called "the square" of the number. "The square" is used to designate the product obtained by multiplying a number by itself, whether or not that product is thought of geometrically as a square. The square of a number is indicated by a little figure called an *exponent;* thus $4^2=16$; $9^2=81$.

The above are read: *4 squared=16; 9 squared=81;* or *the square of 4=16; the square of 9=81.*

The area of a square is 144 square feet. What is one side? 12 feet.

The area of a square is 169 square miles. What is one side? 13 miles.

Note the relation between areas and sides below.

Areas	Side
400 sq. ft.	20 ft.
36 sq. in.	6 in.
49 sq. yd.	7 yd.
121 sq. rd.	11 rd.

Finding the line upon which a square is built, or finding what number multiplied by itself gives a certain square, is called "finding the square *root* of the number," that is, finding the line or number out of which the square *grows.* And, as is usual in mathematics, there is a sign used to indicate what is sought; thus $\sqrt{25}$ stands for *the number which multiplied by itself makes 25.* The sign is called the *radical sign—root sign.*

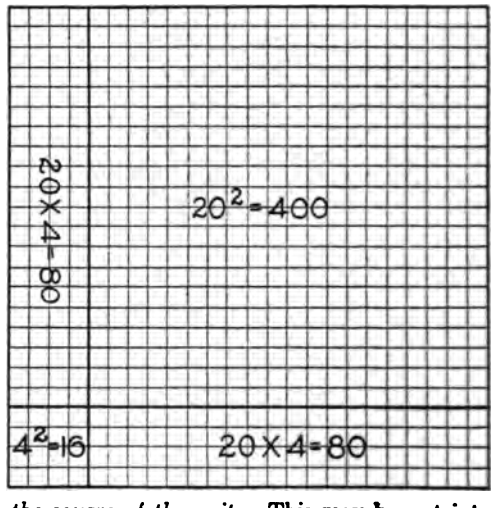
Find the values of the following:

3^2	$\sqrt{64}$
5^2	$\sqrt{6400}$
1^2	$\sqrt{144}$
14^2	$\sqrt{14400}$
30^2	$\sqrt{\frac{1}{4}}$
$(\frac{1}{2})^2$	$\sqrt{\frac{25}{36}}$
$(\frac{5}{6})^2$	$\sqrt{25}$
40^2	$\sqrt{.25}$
$(2\frac{1}{2})^2$	$\sqrt{.0025}$
17^2	$\sqrt{169}$
$(\frac{5}{8})^2$	$\sqrt{225}$

Squaring a Number Consisting of 10's and Units. Square 46.

$46 = 4 \text{ tens} + 6 \text{ units}$
$46^2=(40+6)^2$
$40 + 6$
$40 + 6$
$40 \times 40 + (40 \times 6) + (40 \times 6) + 6^2$
$40^2 + 2 \times (40 \times 6) + 6^2$
$1600 + 480 + 36 = 2116$
$39^2=(30+9)^2=30^2+2\times(30\times9)+9^2$
39
39
$81 = 9 \times 9$
$270 = 9 \times 30$
$270 = 30 \times 9$
$900 = 30 \times 30$
$1521 = 39 \times 39$

The square contains the square of the tens, twice the product of the tens by the units, and



the square of the units. This may be put into a more concise form, thus:

$\text{number}^2=\text{tens}^2+2\times\text{tens}\times\text{units}+\text{units}^2$

Many numbers of this class should be squared on cross-section paper by students taking up the subject of square root.

The root is found by *taking the square apart along the lines upon which it was built up.* In other words, it must be taken apart along its *construction lines.*

Square Root of Numbers Consisting of 10's and Units. What number squared gives 2025?

$n^2 = 2025$
$n = \sqrt{2025}$
$2025 = \text{tens}^2 + 2 \times \text{tens} \times \text{units} + \text{units}^2$

$40 + 5$
2025
$1600 = \text{tens}^2$
$2 \times 40 = 80$ | $425 = 2 \times \text{tens} \times \text{units} + \text{units}^2$
$400 = 2 \times \text{tens} \times \text{units}$
$25 = \text{units}^2$
$25 = \text{units}^2$

Explanation:

(1) What is the largest square of tens in 2025? 1600.

(2) What, then, is the tens? 40.

(3) Place 40, or 4 tens, in the root.

(4) Subtract 1600; the remainder 425 must contain $2 \times \text{tens} \times \text{units} + \text{units}^2$.

(5) Units^2, being comparatively small, may be neglected for the time; and $425 = 2 \times \text{tens} \times \text{units}$.

(6) The tens is 40; and $425 = 2 \times 40 \times \text{units}$.

(7) Divide 425 by 2×40 and find units to be 5.

(8) Subtract 5×80 from 425.

(9) The remainder must be units^2.

(10) It is found to be so—$25 = 5^2$.

When dividing by $2 \times \text{tens}$, we must bear in mind that there must be a remainder equal to the units^2. The following problem illustrates the point:

$\sqrt{784} = n$
$20 + 8 = 28$
$784 = t^2 + 2 \times t \times u + u^2$
$400 = t^2$
$2 \times 20 = 40$ | $384 = 2 \times t \times u + u^2$
320
$64 = u^2$
$64 = 8^2$

Note that when dividing 384 by 40, it seems that the quotient is 9. But upon taking out 9×40 there is not enough left to give units^2; the remainder is 384—360 or 24, which is not 9^2. So we see the quotient is only 8, giving a remainder of 64, which is 8^2.

Squares of numbers from 10 to 100 have three or four digits; squares of numbers from 100 to 1000 have five or six digits. So the square root of any number of three or four digits lies between 10 and 100; that is, has two digits. The square root of a number of five and six digits lies between 100 and 1000; that is, has three digits. Therefore, in finding the square root, an integral number is separated into groups of two digits each, beginning at the right. The number of digits in the root is equal to the number of groups; for example, $\sqrt{72'25}$ has two digits, $\sqrt{1'63'84}$ has three digits, $\sqrt{10'49'76}$ has three digits.

A decimal number is divided into groups, *beginning at the decimal point,* and counting to the left and to the right; for example, $\sqrt{2'07.36}$, $\sqrt{2'08.22'49}$.

The usual concise method of solution is as follows:

28
7'84
4
$2 \times 20 = 40$ | 3 84
$+8$ | 3 84
48 | 0

Here the zeros showing the full value of tens and tens^2 are dropped, and units when found is added to the "trial divisor" ($2 \times \text{tens}$) before multiplication, thus including the square of the units in the product. With students taking it up in arithmetic, the first method given here is much more easily understood.

Square Root of Numbers of More Than Four Digits. Find the square root of 104976.

$\sqrt{104976} = n$
$300 + 20 + 4 = 324$
104976
$90000 = t^2$
$2 \times 300 = 600$ | 14976
$12000 = 2 \times t \times u$
2976
$400 = u^2$
$2 \times 320 = 640$ | 2576
$2560 = 2 \times t \times u$
$16 = u^2$
$16 = 4^2$

After 320 is found, we know there are 32 tens in the root, and after taking out 20^2, or 400, we proceed to find units. The process is shortened below:

324
10'49'76
9
$2 \times 30 = 60$ | 149
2 | 124
62
$2 \times 320 = 640$ | 2576
4 | 2576
644

Square Root of Decimal Numbers. 1. A product contains as many decimal places as the two factors that make it.

2. The square is a product and the factors are equal.

3. Therefore a square always has an *even* number of decimal places, and the root has one-half as many decimal places as the square.

4. To find the square root of a decimal number (a) work as if it were an integer; (b) point off one-half as many decimal places in the root as there are in the square.

$\sqrt{1.44}=1.2$ $\sqrt{.0009}=.03$

$\sqrt{.64}=.8$ $\sqrt{2.25}=1.5$

$\sqrt{.625}=\sqrt{.6250}=n$

```
      .79
    .62'50
      49
2×70=140 | 1350
       9 | 1341
  149      9
```

Note that .625 has but three decimal places; add one place so that it has an *even* number of decimal places.

A root is carried out as many decimal places as desired by annexing *two* decimal zeros to the square for *each* decimal place desired in the root; for example, find $\sqrt{3}$ to two decimal places.

```
      1.73
    3.00'00
      1
2×10=20 | 200
     +7 | 189
     27
2×170=340 | 1100
     +3 | 1029
    343
```

A.H.

SQUASH, a plant of the gourd family cultivated for its fruit. It is a familiar and well-liked garden vegetable. Squash is cooked in various ways. It is most commonly served in the same way as mashed potatoes, or used as

TWO VARIETIES

In rear, summer squash; in foreground, crookneck squash.

filling for pies. The plant grows as a trailing vine and as a bush, and bears large green leaves with many lobes, and large, tubular, orange-yellow flowers. There are two general kinds, the *summer* and the *winter.* Summer varieties, represented by the *crookneck,* usually grow as bush plants. The fruits are usually smaller than winter varieties, and the plants have hard, dense stems. Summer squash will grow in the shade of cornstalks or in a sunny situation, and will endure both heat and drought, as this type adapts itself readily to almost any condition. A summer squash is gathered and eaten before fully ripe.

Winter varieties, represented by the *Hubbard,* are usually vine plants. The fruits are heavy and thick-skinned. They are allowed to come to maturity but must be gathered before frost injures them, and if stored in a dry

WARTED HUBBARD SQUASH

place they will keep through the winter. The best-liked varieties retain their green color when ripe. Squashes do best in a soil containing a good deal of humus. Bush varieties are planted in hills about four feet apart each way, but trailers need more space.

Squash Bug, an ill-smelling insect that attacks both squash and pumpkin vines. It is slightly more than half an inch long, and is brownish-black above and dirty yellow below. Adult insects sleep through the winter. The eggs are laid in the spring on young leaves and sprouts, and the young hatch in about two weeks. They injure the growing plants by sucking the sap. There are several measures used to combat the pest. One of these is picking the bugs off the vines before the eggs are laid. Young plants should be protected by means of frames covered with mosquito netting. Bugs can be trapped under shingles placed about the vines, and then be destroyed. Any egg clusters which are found should be crushed. M.K.

SQUATTER SOVEREIGNTY, *skwat'er sov'er in ti,* or **POPULAR SOVEREIGNTY,** in the history of the United States, was the doctrine that the inhabitants of a territory had the right to regulate their internal affairs without interference from the national government. Whence or from whom the theory came is not known, but its first public statement by a man of prominence was in a letter written by Lewis Cass (December, 1847), who suggested that the territories be allowed "to regulate their internal

concerns it their own way." It is exceedingly doubtful if such a doctrine would ever have been proposed or given support if Congress had not been face to face with the problem of the extension of slavery into the territory acquired from Mexico. The North, as a whole, was opposed to the extension of slavery into the territories, while the South was almost unanimous in its favor. Both North and South were inclined to regard the theory of squatter sovereignty as a happy solution, which relieved the states and Congress of a difficult problem.

In the Compromise of 1850 the principle seems to have been recognized, because of the omission of reference to slavery in Utah and New Mexico, and in the Kansas-Nebraska Bill of 1854 it was expressly adopted as a basis. Soon afterwards, however, the doctrine was repudiated by the South, and in the election of 1860 it caused a split in the Democratic party, the Northern wing nominating for President Stephen A. Douglas, who had been for ten years the foremost advocate of popular sovereignty, while the Southern wing, demanding that Congress take vigorous action to defend slavery in the territories, nominated John C. Breckinridge. With the close of the War of Secession and the abolition of slavery, the question lost all political significance (see POLITICAL PARTIES).

The terms *squatter sovereignty* and *popular sovereignty* originally had different meanings, and their confusion in United States history is unfortunate. A *squatter* was a settler who occupied land without having acquired legal title to it, and the old doctrine of "squatter sovereignty," dating from colonial times, gave him legal title after a certain period of years, if the rightful owner did not appear and enter a protest. Many of the early settlers in Kansas, Nebraska and other states west of the Mississippi River were squatters. The remoteness of the land from other settlements, together with the difficulties of determining and acquiring title, gave many an emigrant the chance to pick out and occupy a tract of land that suited him, without taking the trouble to locate the previous owner. Thus popular sovereignty was associated with the squatters of Kansas and Nebraska, and the name *squatter sovereignty* became a synonym in more general use than the correct term, *popular sovereignty*, or sovereignty inhering in the people. W.F.Z.

SQUID, *skwid*, a large group of sea mollusks having internal shells and ten movable arms about the mouth. The common squid, which inhabits the coast waters from Maine to South Carolina, is typical of the family. It has a long, pointed body, with two fins at the posterior end, united at the back. Two of its ten arms are longer than the other eight, but all have rows of sucking organs. It has a large head and a mouth equipped with two horny jaws and a rasping tongue. The body of the squid is spotted with several different tints, and it can change its color at will to correspond with its environment. Like others of its family it has an ink bag from which it ejects a dark fluid to discolor the water when fleeing from an enemy. Aided by their sucking disks and movable arms, the squids successfully prey on small fish, and they themselves are eaten by fish, eels, dolphins and sea birds.

The common squid is from eight to twenty inches in length, but there are giant specimens off the Newfoundland coast with bodies from eight to ten feet long and tentacles attaining a reach of forty feet. Sailors tell nearly unbelievable stories of squids having sucking disks as large as dinner plates. These giant sea animals are eaten by whales.

SQUILL, *skwil*, the name of several plants with bulbous roots, belonging to the lily family. A species which grows in countries around the Mediterranean produces bulbs sometimes weighing four pounds and of medicinal value. They are collected in August. The outer husk is removed and the bulb is sliced and dried in the sun. The drug made from these bulbs is generally used in the forms of syrup and the tincture of squill. It stimulates the heart and has decidedly irritating qualities, affecting particularly the stomach, intestines and bronchial tracts, and for this reason it cannot be given alone. Squill is sometimes used in chronic bronchitis, but never in the acute disease. Its use is decreasing, because its irritant qualities overbalance the good it may do.

SQUINTING, *skwint'ing*, or **STRABISMUS**, *stra biz'mus*, that defect of the eyes which is the affliction of persons said to be *cross-eyed*. Under normal conditions the two eyes can be directed toward an object with the same axis of vision. There are four muscles which make this possible—attached above and below and on each side of the eyeball. Injury to one or more of these muscles causes the affected eye to turn out of its normal position. Sometimes both eyes are affected. That form of squint is most common in which the eye or eyes seem to be looking at the nose. The trouble is remedied by an operation or by fit-

ting glasses to the eyes; sometimes both are necessary. A cross-eyed baby should always be treated by a skilled eye specialist as soon as the trouble arises, for it is no longer necessary to have a child grow up with this unsightly deformity. Because of the great advance made in recent years in the treatment of eye troubles, squint is much less common than formerly. See EYE.

SQUIRRELS, *skwur'elz,* a large group of rodents, or gnawing animals, which live in trees or under the ground and are found in woodlands in nearly all parts of the world. Australia is the only continent from which they are absent. Squirrels are graceful, agile animals with long, plumelike tails and somewhat slender bodies. Some are but a few inches in length, and others are as large as a full-grown cat. Their color ranges from black through reddish-brown to gray. The habits of the typical squirrel are suggested in these lines from Mary Howitt's popular poem:

THE SQUIRREL

In the joy of his nature he frisks with a bound
To the topmost twigs, and then to the ground;
Then up again, like a winged thing,
And from tree to tree with a vaulting spring;
Then he sits up aloft, and looks waggish and queer,
As if he would say, "Ay, follow me here!"
And then he grows pettish, and stamps his foot;
And then independently cracks his nut;
And thus he lives the whole summer through,
Without a care or a thought of sorrow.

Squirrels do take thought of the future, however, for they store away nuts to last them through the winter.

Kinds of Squirrels. The *red squirrel,* or *chickaree,* ranging from Northern United States to the tree limit in Canada, is the most widely distributed of several American species. The chickaree is an active little creature not over eight inches long, excluding the bushy tail. Its upper parts are chestnut red, the lower parts white, and there is a black stripe along each side. The ears have on the tip a tuft of hairs. It lives almost entirely in trees, seeking a home in a hollow trunk, or making a special nest of leaves and twigs. Its favorite diet of nuts and grain is varied by birds' eggs, young birds, insects, fruits and tender twigs. Red squirrels keep up a shrill, noisy chattering. Their young, three or four to a litter, are born in the spring.

There are a number of species of *gray squirrels* in America. One of the commonest ranges from New England west to Minnesota, and is hunted in the East both for its skin and its flesh. This squirrel is ten inches long. Like the red squirrel, it eats the young and eggs of birds, but is less prone to this bad habit than its smaller brother. One of its means of escaping the notice of its own enemies, particularly the hawk, is to flatten out on the side of a horizontal branch; in this position its gray-coated body is even more inconspicuous than usual. Gray squirrels have a habit of calling to one another by "barking," or uttering a series of sounds that end in a sort of snarl. They are often seen in city parks, where they become so tame that they sometimes climb on the shoulders of passers-by. There are other species of gray squirrels in the southwestern part of the United States and in California.

The *fox squirrels* are larger and handsomer than any of the species mentioned. They are found in the Middle states and in the South. Some are jet black, others reddish-gray, and there are others with colors ranging between these shades. In Europe there is a *common squirrel* which ranges all over the continent. It is colored like the chickaree but is somewhat larger. The squirrels of the tropics are noted for their brilliant coloring, and there is an Oriental species which changes its gray coat for one of bright orange-yellow in the breeding season. This is the only known mammal which has a variation of color corresponding to the changes in the plumage of birds.

There are two other interesting groups of squirrels, those that live in burrows in the ground, and those that fly. The most important *ground squirrel,* the *chipmunk,* is described in these volumes under that title. M.S.

Consult Seton's *Life Histories of Northern Animals;* Hornaday's *The American Natural History.*

Related Subjects. The reader is referred to the following articles in these volumes:

Chipmunk	Fur and Fur Trade
Flying Squirrel	Rodents

SQUIRRELTAIL GRASS, a name frequently applied to WILD BARLEY (which see).

STA'DIUM, originally the foot-race course in Olympia, Athens and other places in Greece

where athletic contests were celebrated. It was usually enclosed by terraces having the general shape of a horseshoe, which afforded the spectators a clear view of the field. Occasionally these terraces had seats. The ancient stadium at Athens was recently restored and served as the scene of the Olympian games in 1906. The stadium was also a measure of distance among the Greeks. It was the distance between the terminal pillars of the stadium at Olympia, and was the equivalent of 606 feet 9 inches in English measurement.

In modern times structures similar in type to the Greek stadium have found favor on the athletic fields of universities. Such uncovered buildings, with seats arranged in tiers, have been erected on athletic fields, notably at Harvard, Yale, Princeton and Syracuse universities. The Harvard stadium is a huge structure of reënforced concrete, built in the form of the letter U, and capable of accommodating over 40,000 spectators. The "Yale Bowl," which has a still greater seating capacity, is built in the form of an ellipse, with seats enclosing the field on all sides. Although these modern stadia, like the ancient ones, are designed chiefly for spectators attending various athletic contests, it is not uncommon to utilize them for dramatic performances, especially those which are elaborate and spectacular.

STADTHOLDER, *stat'hol der,* the title formerly given to the chief executive of the United Netherlands. The term is variously translated to be the equivalent of chief magistrate, lieutenant, governor, viceroy and delegate. The name was first applied in case of one who was appointed in *stad* or in *stead* of the sovereign—that is, one who represented the ruler as head of a state or province.

After the union of the six states which formed the confederation in 1579, the term *stadthouder,* or *stadtholder,* came to be interpreted as meaning one who holds a city. With this significance it was applied to the office held by William the Silent, Prince of Orange, who was chosen by the people for their ruler. This title was used by his descendants for three generations, and continued to be that of the ruler of Holland until that country was annexed to France in 1802. In 1814 the term ceased to be used, when the title of king of the Netherlands was given to the Prince of Orange.

STAËL-HOLSTEIN, *stah'el hohl'stine,* ANNE LOUISE GERMAINE (1766-1817), generally known as MADAME DE STAËL, a French writer, daughter of Jacques Necker, who was minister of finance to Louis XVI. She was by nature an unusually bright child, and her association with the brilliant people who frequented her father's house increased her interest in matters intellectual and in the affairs of the times. At the wish of her parents she married the Swedish minister, Baron de Staël-Holstein, who was much older than she and with whom she was far from happy. The marriage terminated in a friendly separation, and Madame de Staël continued to live the independent life for which she was fitted.

In 1788 she published her *Letters on Jean Jacques Rousseau,* a very enthusiastic comment, and in various ways showed her approval of the sentiments and events of the early months of the Revolution. Later, however, when she felt that the reformers were becoming extreme, she was active in defense of the royal family, and carried her advocacy so far that she was obliged to flee from the country. She returned in 1794 to Paris, but nine years later was banished by Napoleon, whose suspicions had been aroused. During the years of her exile she lived in Germany, and there became acquainted with the greatest literary men of the time, Goethe, Schiller and Schlegel.

Her works of importance include the novels *Delphine* and *Corinne,* once very popular but now comparatively little read; *Literature in Its Relation to Social Institutions; On Germany,* and *Thoughts on the French Revolution.* More important than any single work was her influence in introducing the romantic movement into France, which up to that time had never freed itself from classic formalism. In this great movement she may be regarded as the foremost figure, and is thus ranked as one of the notable literary personalities of France.

Consult Birch's *Secret Societies and the French Revolution.*

STAFF, a military term referring to a body of officers whose duties are connected with a regiment or army as a whole, and not attached to any particular subdivision. In the hands of regimental staff officers is left the arranging of all details concerning the routine, equipment and discipline of the regiment. The staff officers see that the orders of the commanding officer are carried out and that the regiment is always supplied with all things necessary to the efficient performance of its duties.

The Staff in the United States. The formation of a *general staff* is modern, and in the United States is based much on the same principles as the general staff of the German army.

The chief of staff is head of all departments of the army and responsible only to the President, who is the constitutional head of the army as a whole. Responsible to the chief of staff are the military secretary, quartermaster-general, inspector-general, the chief of engineers, chief of ordnance, judge-advocate-general, chief signal officer and the chief of the bureau of insular affairs. Thus the head of every department of the service is responsible to the chief of staff, and through him, direct to the President.

The general of the United States army has a personal staff consisting of six officers called aids, ranking as colonels. A lieutenant-general has two aids and a military secretary, ranking as lieutenant colonels; a major-general has three aids, each with the rank of captain or lieutenant.

European Staffs. The general staff of the German army, the most efficient organization in any modern army prior to 1915, performs the duties of collecting, adding to and arranging information on military matters and the training of the officers for duty. Divided into sections, the staff concerns itself with plans of operations in case of war with any nation in the world. Campaigns are drawn up; details of the most minute kind are collected concerning the roads, rivers, towns, bridges, villages, railway facilities—in fact, nothing concerning the country under consideration is regarded as too trivial for attention. There are six sections of the German general staff, all working under a director. Their information on all countries is complete, tabular, indexed for ready reference, each section taking charge of information concerning certain countries. What is called the "third section of the general staff" is devoted to collecting information concerning England, France, Italy, Switzerland, Spain, Portugal and the United States, and it is claimed that the maps of these countries obtained by the staff are more correct and detailed than any to be obtained in those countries themselves.

All generals of the German army must have served on the general staff, and a constant exchange of officers from the line to the staff and staff to line is the rule. The German general staff organization is now copied by most European countries and by Japan, which country, after careful consideration, decided that Britain and the United States were to be its models on naval matters, but Germany its guide in military organization. See ARMY. F.ST.A.

Consult Wilkinson's *The Brain of an Army.*

STAFF, an inexpensive compound resembling plaster and used instead of stone for temporary buildings, architectural decoration and statuary. It consists chiefly of plaster of Paris and hydraulic cement, mixed in water with dextrin and glycerine. Staff was first used as a covering for buildings in the Paris Exposition in 1878, and it was extensively employed on the buildings of the World's Columbian Exposition at Chicago in 1893, of the Louisiana Purchase Exposition at Saint Louis in 1904, and of the Panama-Pacific expositions at San Francisco and San Diego in 1915.

STAG, the male of the red deer, the common deer of Europe. A full-grown stag is a handsome animal, standing about four feet high at the shoulder, and with branching horns three feet in length. Hunters find the pursuit of this noble animal a very thrilling sport, as it is fleet of foot, a skilful swimmer and possessed of keen sight and hearing. The opening canto of Scott's *Lady of the Lake,* which contains a spirited account of a stag hunt, describes a characteristic of the animal in these lines:

> As Chief, who hears his warder call,
> "To arms! the foemen storm the wall,"
> The antlered monarch of the waste
> Sprang from his heathery couch in haste.
> But, ere his fleet career he took,
> The dewdrops from his flanks he shook,
> Like crested leader proud and high,
> Tossed his beamed frontlet to the sky.

The North American wapiti or elk (which see) is closely related to the stag. See, also, DEER.

STAG BEETLE, *be't'l,* a family of insects in which the males of certain species have curious hornlike processes on the mandibles. In some cases these horns are nearly as long as

THE STAG BEETLE
(*a*) Female; (*b*) male; (*c*) grubs.

the body of the beetle. The resemblance of these projections to the horns of a stag has given rise to the name of the family. Common American species include the *giant* stag beetle of the Southern states, with mandibles an inch

long and body one and one-half or two inches; and the *pinching bug* of the Eastern states, an insect that flies by night. The adult stag beetles live in trees and feed on sap and on honey dew. The eggs are deposited in crevices of the bark, where they hatch into soft white worms (larvae). See BEETLE.

STAGHOUND, a large, white hound with black and tan markings, probably descended from the bloodhound. Its head resembles that of a pointer, but the neck is heavier, the ears more hanging and set lower. There are two strains, the *northern* and *southern*. As the name indicates, these dogs were used for hunting red deer, the male of which is called a stag. Staghounds are almost entirely European dogs, and even there they are rapidly being replaced by the foxhound (which see).

STAINED GLASS, in reality is glass stained by chemical process, but the name is also applied to glass which is painted or otherwise colored, particularly such glass as is used in what are known as stained glass windows. In medieval windows of this kind the color was actually incorporated in the glass by a mixing process in the making of the glass itself. This was called "pot metal." Medieval windows were a patchwork of different colored pieces of glass, made into shapes required by the design of the window and put together in much the same way as a colored picture puzzle. The pieces of glass were generally held together by strips of lead soldered together at intervals. The stained glass of medieval days was not made, as it is now, in large panes.

The United States leads the world in the manufacture of stained glass, and the excellence of the product is largely due to the efforts of John La Farge and Tiffany of New York. The processes of manufacture have greatly changed, and it is now easy to obtain effects such as were absolutely impossible with older methods. It was only at the end of the nineteenth century that the art of glass staining assumed commercial importance in America. Previous to that time all stained glass was imported, and but poor imitations of the real art could be obtained. The American artists took up glass staining at the point where the medieval artists ceased to develop it. The wonderful stained glass windows of European cathedrals are priceless chiefly on account of their antiquity. Modern stained glass is superior in effect, coloring and design. So much has the stained glass industry of the United States gained ground that over $3,000,000 is now invested in the art, and there is little importation from foreign countries.

Consult Westlake's *A History of Design in Painted Glass;* Eden's *Ancient Stained and Painted Glass.*

STALACTITES AND STALAGMITES, *sta lak' tites, sta lag' mites,* curious and beautiful deposits of limestone which are formed in caves and under stone bridges and arches by the slow trickling of water through cracks and rocks. Stalactites hang from the roofs like icicles, while stalagmites are like inverted icicles, formed by the drip of water on the floor. Sometimes they grow to meet each other and form columns, or take curious and fantastic shapes. Great caves festooned with stalactites, similar to the wonderful ice caves of the Polar regions, are found at Adelsberg in Styria, Austria, at Jenolan in Australia, in Kentucky (Mammoth Cave) and in Belgium. In the lava caves of many of the East Indian Islands glistening black stalactites of basalt hang from the roofs. See MAMMOTH CAVE.

STAM'FORD, CONN., a city in Fairfield County, in the southwest corner of the state, on Long Island Sound and on the New York, New Haven & Hartford Railroad. It is thirty-four miles northeast of New York City and seventy-five miles southwest of Hartford. The population, which was 25,138 in 1910, had increased to 35,119 in 1916 (Federal estimate). The area is seven and a half square miles. Stamford was settled in 1641, and for two hundred years was principally an agricultural community. It was incorporated in 1893, and is an attractive residential city with several important manufacturing establishments. Features of special note are the town hall, state armory, Federal building, Y. M. C. A. building, Ferguson Library (a beautiful example of colonial architecture), Stamford Hospital and churches. Along the Sound is Halloween Park (eighty-eight acres), and throughout the city are a number of small parks and playgrounds. The city has several excellent private schools. Stamford is noted as the city in which Yale locks are manufactured. Other important manufactures are stoves and ranges, submarine cables, tanning extracts, pianos and paints.

STAMMERING, *stam' cr ing,* a defect of speech resulting from imperfect action of the muscles used in articulation. There are several varieties of stammering. A common form, also known as *stuttering,* is the affliction of those who repeat several times the first syllable of certain words, especially those beginning

with *b, p, t* and *d*. In other cases certain sounds are slurred or omitted altogether, or one sound is used in place of another. Some persons are afflicted with a silent form of stammering, in which speech fails them entirely. The trouble is frequently caused by nervousness, and is often associated with Saint Vitus's dance (which see). It may be inherited, and statistics show that it is much more common in males than in females. If proper treatment is not applied, a person who begins to stammer in early childhood may continue to do so all his life.

Modern authorities believe that one of the best means of treating the disorder is teaching breath control. Cures have been effected by the use of singing lessons, as rhythm has been found an aid in teaching correct breathing and enunciation. Such conditions as eyestrain, diseased tonsils, nasal catarrh and the like are often predisposing causes, and should receive the attention of a reliable physician.

By exercising patience and persistence, a mother can often cure her child of stammering if the case is not too serious. Scolding or ridicule will never accomplish the slightest good result. The child should be directed to breathe slowly and deeply and to repeat carefully the syllables that give him trouble in articulation.

See EDUCATION, subtitle *Hygiene of Education.* C.B.B.

Consult Scripture's *Stuttering and Lisping.*

STAMP, an adhesive paper bearing an impression or device authorized by law and adopted for attachment to some subject of duty or excise; also, an impression on paper made by order of government, to be used for the purpose of raising revenue. The presence of such a paper or impression on a document of any kind is evidence that the laws respecting it have been complied with.

Stamp duties were first imposed by the Dutch in 1624. In England the plan was first resorted to in 1694, to raise money for carrying on a war with France. The subject of stamp duties is of great historical interest to the United States, as it was the passing of the Stamp Act of 1765 by the English Parliament that led directly to the Revolutionary War.

In 1862 the Congress of the United States passed a law requiring that stamps, especially prepared for the purpose, should be affixed to legal papers and documents, and to packages of many different kinds of merchandise. This was done to raise funds to pay in part the expenses of the War of Secession, and the law was repealed when the necessity was removed. Again, in 1898, a similar law was passed, on account of the war with Spain. These stamps, called internal revenue stamps, are now required on tobacco, cigarettes, liquors, etc., and on such articles as oleomargarine, filled cheese, opium, mixed flour, and the like.

The form of stamp with which peoples of all countries are most familiar is the postage stamp; it is fully described in these volumes.

Related Subjects. The reader is referred to the following articles in these volumes:

Internal Revenue	Stamp Act
Postage and Postage Stamps	Tax and Taxes

STAMP ACT. The growing prosperity of the colonies in America and the increasing debt of the mother country induced the British ministers in 1764 to attempt to raise revenue in America to meet home expenses, and partially

USED UNDER THE STAMP ACT

Three of the stamps of the British government imposed on the American colonies.

to make the colonies self-sustaining. In March, 1765, the Stamp Act was passed, imposing a stamp duty on all commercial papers, legal documents and newspapers. Although the colonies had signified their willingness to raise money to assist in paying the debt incurred by England in the French and Indian Wars, they denied that Parliament had the right, arbitrarily, to impose a tax upon them, since they were not represented in that body. Therefore the publication of the act "operated in America like a spark dropped on a tinder," although the cost of each stamp was trifling.

By acts of violence the stamp distributor, admiralty deputy and lieutenant-governor in Massachusetts were forced to resign. Patrick Henry denounced the British government and influenced the Virginia assembly to pass resolutions against taxation by Parliament, and at the request of Massachusetts, a congress in which nine of the colonies were represented, the first colonial congress in America, met at New York and drew up a statement of the position of the colonies. This was called the Stamp Act

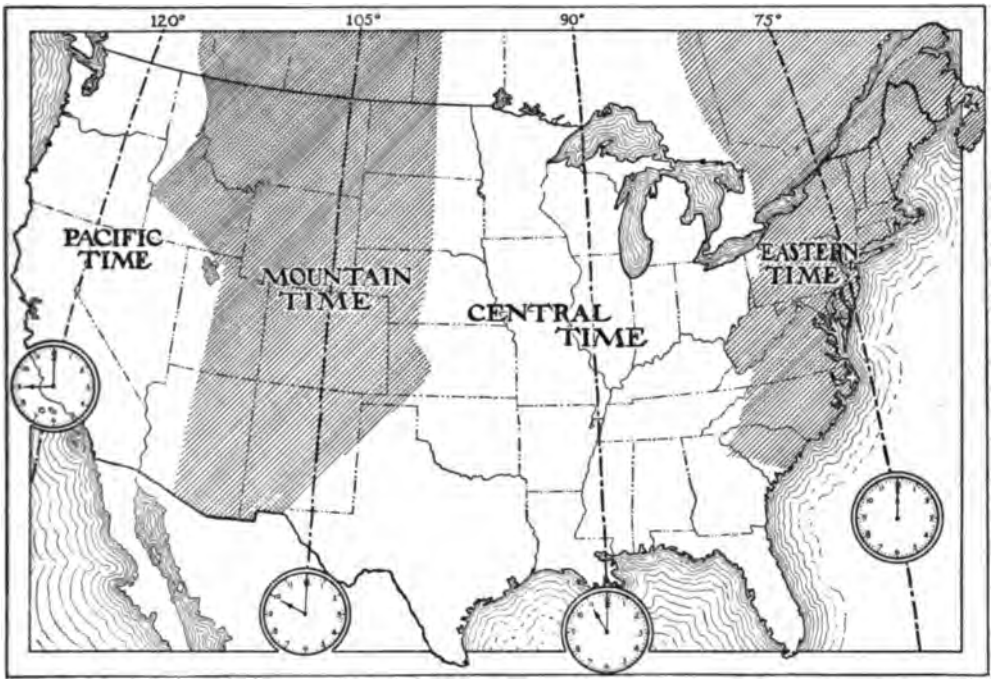
Congress. Though the act was repealed in March, 1766, the right to tax the colonies was reiterated. The repeal of the Stamp Act only led to another and heavier tax which resulted in open defiance on the part of the colonies, the closing of the port of Boston by England and the ultimate break between the colonies and the mother country. See REVOLUTIONARY WAR IN AMERICA.

Consult Howard's *Preliminaries of the Revolution.*

STANDARD OIL COMPANY. Until a decree given in 1911 by the Supreme Court of the United States was put into effect, there existed in America a powerful petroleum "trust," consisting of nearly seventy oil companies controlled by the Standard Oil Company of New Jersey. In obedience to the court's order the New Jersey company distributed among its stockholders its holding in thirty-three companies, including the Standard Oil companies of six other states; nominally, at least, there is no longer an oil "combine" in the United States. But the old holding company still controls the Imperial Oil Company, Ltd. (which has almost a monopoly of the Canadian petroleum trade) and a number of foreign companies, among them a powerful German company.

The Standard Oil combination, perhaps the most powerful industrial organization that has ever existed, was a monument to John D. Rockefeller and his associates. Mr. Rockefeller built his first petroleum refinery in Cleveland in 1862, three years after the world's first oil well was bored. By thorough efficiency and by securing rate favors from the railroads he became the undisputed leader in the industry. In 1872 he organized a secret combination of the larger refineries, and ten years later incorporated the Standard Oil Company of New Jersey.

Consult Montague's *The Rise and Fall of the Standard Oil Company;* Tarbell's *History of the Standard Oil Company.*



THE ZONES OF STANDARD TIME

STANDARD TIME, the system by which time is now measured in the daily affairs of life. When the sun is on the meridian of any particular place, the time at that place is noon. This is true *solar time,* or *sun time.* As the earth turns on its axis from west to east, the sun appears to travel from east to west, and the point at which the sun is on the meridian is likewise moving from east to west. Thus, the sun is on the meridian at Cincinnati about an hour later than at New York; in other words, when it is noon by sun time in New York, it is only 11:00 o'clock in Cincinnati. At all places east of New York it is afternoon,

because the sun has already passed them. It is clear that every fraction of a degree of longitude has a different true noon.

A system of standard time was advocated to remedy the confusion which arose from the difference in local sun time. The old system of using sun, or local, time was especially annoying to travelers, for each railroad and city had its own time. The result was that several railroads meeting in a town might all use different time systems; a traveler arriving at a terminus at 11:00 o'clock might wish to take another train at 10:30 and, because of differing time standards might have to wait some time for his outgoing train, or he might find his train already gone.

The need of a standard for all parts of the world led to the Prime Meridian Conference at Washington, D. C., in 1882. As a result of this conference the railroads of the United States and Canada adopted in 1883 the system of standard time. The railroads having adopted a uniform system, it was not long before the use of standard time was general in all lines of enterprise. In some rural communities the change was slow, but once adopted it has always been retained because of its simplicity and convenience.

Under the system of standard time, the continent is divided into parallel zones, each of which takes the sun time of practically its central meridian. These central meridians differ from Greenwich longitude by exact multiples of 15°, this being the distance traveled by the sun in one hour. Thus, the standard time meridians in North America are 60°, 75°, 90°, 105° and 120° W. Each zone extends 7° 30′ east and the same distance west of the standard meridian. For practical purposes, the limits of the time zones are not rigid; for example, if a town lies on both sides of a meridian, the same time is kept in all parts of the town, and particularly in the western part of the United States the boundaries of zones are uneven, that terminal points of great railroad systems may have the same time as their eastward-stretching divisions.

The time of the 60th meridian is called *Atlantic,* or *Colonial* time; that of the 75th is *Eastern;* of the 90th, *Central;* of the 105th, *Mountain,* and of the 120th, *Pacific.* These are respectively four, five, six, seven and eight hours earlier than Greenwich time. W.F.Z.

Consult Allen's *Short History of Standard Time.*

STANDISH, MILES, or MYLES (1584-1656), an American colonist, born in Lancashire, England. What little education he possessed was received in that shire, but most of his youth was spent in the British army. Before 1603 he had been appointed lieutenant, for bravery, in the wars in Holland, and in 1609 he joined

THE STANDISH GRAVE
At Duxbury, Massachusetts.

the Puritan colony in that country. He was not, however, a member of the church of the Puritans, but simply their assistant in colonization plans and in training their militia. He was one of the passengers on the *Mayflower,* and immediately after its landing at Plymouth, Mass., was chosen military captain of the colony.

His soldiers were few, but he made such a brave show with them on several occasions that the Indians greatly feared him. In 1622, when the savages planned the destruction of both Weymouth and Plymouth, Standish with only eight men attacked their camp, killed their two chiefs and put the assembled tribes to flight. He had unusual business ability, and as assistant to the governor and treasurer of the colony secured reductions in British claims that saved the colonists thousands of dollars. *The Courtship of Miles Standish,* by Longfellow, who was a descendant of John Alden and Priscilla Mullins, was not intended to be accurate in every detail, but the main points of the courtship as given in the poem are correct.

Related Subjects. The article MAYFLOWER includes a list of names of the *Mayflower's* passengers, in the exact language and spelling of Governor Bradford. See, also:

Alden, John	Pilgrims
Bradford, William	Plymouth Rock
Massachusetts Bay Colony	Puritans

STANFORD, LELAND (1824-1893), an American capitalist and philanthropist, who assisted greatly in building the great West, was born at Watervliet, N. Y. After a brief school course

and some study of law in his home town, he went to Port Washington, Wis., in 1849, and there practiced law for three years. He was not very successful, so he moved to California to try gold mining. In this he made considerable money, but the real basis of his fortune of $50,000,000 was a mercantile business which he established at San Francisco in 1856. In 1860 he entered politics as a delegate to the convention that nominated Lincoln, and in 1861 was elected governor of California. In the latter year he was chosen president of the Central Pacific Railway, then under construction, and did such successful lobbying at Washington that Congress granted large government aid for the road. Stanford was then requested by the directors to take personal charge of the building of that part of the line crossing the Sierra Nevada Mountains, and he established the remarkable record of laying 530 miles of mountain road in 293 days.

Founded a Great University. From 1885 to 1891 he was United States Senator from California, but after 1885 the chief interest of his life was in Leland Stanford Junior University, at Palo Alto, Cal., a memorial to his son, who died in Rome, Italy, at the age of sixteen. The father and mother, almost crushed by this loss, determined to found an institution of such rank that the boy's name should never be forgotten. Accordingly, in November, 1885, Stanford donated $20,000,000 for this purpose, and each year added gifts of lands, buildings and securities. After his death, Mrs. Stanford presented further securities amounting to $18,000,000, her residence, valued at $400,000, and 1,000,000 acres of land, valued at $12,000,000.

The university erected to the memory of their boy is therefore the richest in the world, as well as one of the highest in scholarship. Leland Stanford died at Palo Alto, where in later years his widow erected one of the most beautiful of American churches to his memory.

STANLEY, FREDERICK ARTHUR, EARL OF DERBY. See DERBY, FREDERICK ARTHUR STANLEY.

STANLEY, SIR HENRY MORTON (1841-1904), whose baptismal name was JOHN ROWLANDS, was one of the greatest of the world's explorers, famous for his discoveries in Africa. He was born at Denbigh, Wales. His youth was one of hardships, for his father died when Stanley was but two years old, and his relatives were too poor to care for him. In 1857, after spending ten years in a workhouse, he sailed as cabin boy on a vessel to New Orleans. Here he attracted the favorable notice of a merchant named Stanley, who adopted him and gave him his name, but who died without making provision for him.

At the outbreak of the War of Secession young Stanley joined the Confederate army, fought at Shiloh, and was there taken prisoner. In 1863, after a visit to Wales, he entered the United States navy, becoming ensign on the *Ticonderoga*. Gradually he took up newspaper work, and his pluck and determination made him particularly valuable as a correspondent in difficult and dangerous situations. After representing the New York *Herald* in Abyssinia and in Spain, he was commissioned by that paper in 1869 to "go and find Livingstone." He spent a year in Egypt, Constantinople, the Crimea, Palestine and Persia, on various missions for the *Herald,* and then embarked for Africa, in October, 1870. See LIVINGSTONE, DAVID.

HENRY M. STANLEY
He opened the "Dark Continent" to the knowledge of man and to the territorial schemes of the nations of Europe.

His African Service. Starting from Zanzibar in February, 1871, Stanley pushed on to Ujiji, on Lake Tanganyika, where he found Livingstone. His first speech when he saw the veteran explorer was characteristic: "Dr. Livingstone, I presume?" At Ujiji he remained for four months, and as the older explorer refused to accompany him back to civilization he left supplies and returned to Europe in 1872.

Two years later, after the death of Livingstone, Stanley returned to Africa to carry on explorations beyond the point which Livingstone had reached. He set out from Zanzibar in November, 1874, with three white men and over three hundred natives, and pushed on into the interior. He sailed about Victoria Nyanza, proving it to be a great lake and not a succession of lagoons, discovered Lake Albert Edward, and in 1876 began what was at once the most perilous and the most important part of his enterprise. This was a journey down the Congo, from its source to its mouth. All of his white companions and half of his native carriers had died before he emerged on the At-

lantic coast in August, 1877, but the course of the great waterway into the heart of Africa had been made clear.

A direct result of this exploration of the Congo was the founding of the Congo Free State, in the interests of which Stanley spent in Africa the years from 1879 to 1884. Stations were founded, treaties were made with the natives, and much additional geographic information was collected. In 1886 he visited the Egyptian Sudan, his object being the relief of Emin Pasha, and on this expedition he again crossed the continent from coast to coast, passing, as he said, through "miles and miles, endless miles, of forest." This was his last trip to Africa, but he had proved himself one of the greatest and most successful of explorers and had contributed more to the knowledge of the "Dark Continent" than any other man, with the exception of Livingstone.

Career in England. Stanley had been through all his years of active work a citizen of the United States, but in 1892 he was renaturalized as a citizen of Great Britain. At the wish of his wife, Dorothy Tennant, whom he had married in 1890, he stood for Parliament, to which he was elected in 1895, as member from North Lambeth. Many honors were conferred upon him, and his books attained a wide popularity. These, which include *How I Found Livingstone; My Kalulu; Through the Dark Continent; In Darkest Africa,* and *My Dark Companions,* have a charm and a dramatic force which are rare in books of travel.

Stanley's great success was due primarily to his inflexible will, which took no account of apparently insuperable difficulties, and to his natural ability to deal with savage peoples. He was always truthful and kind in his dealings with the natives, but did not hesitate to force them to do his will if gentler measures failed and their aid was absolutely essential. A.MC C.

Besides the books by himself referred to above, consult *The Autobiography of Sir Henry Morton Stanley,* prepared by his wife; Rowland's *Henry M. Stanley: The Story of His Life.*

STANOVOI, *stah no voi',* **MOUNTAINS,** a range of mountains in Siberia, running from the Mongolian frontier in a northeasterly direction, terminating at East Cape, on Bering Strait. An offshoot extends in a southerly direction through the peninsula of Kamchatka. The entire length of the range is about 3,000 miles, and the system is more in the nature of a rugged, elevated plateau than a chain of mountains. The greatest height is attained in Mount Tehokhondo, a little over 8,000 feet above sea level. The drainage from its slopes feeds numerous rivers, the most important of which are the Lena, Amur and Yenisei. In the extreme northeast the Stanovoi range forms the dividing line between the Pacific and Atlantic oceans.

The Stanovoi can hardly be regarded as a separate mountain system, being in reality a continuation of the Yablonoi range, which is similar in formation and appearance. As far north as the parallel of 60° the lower slopes are densely forested, but further north they become bare and desolate. The whole range is rich in minerals, but it is practically undeveloped, such mining as has been carried on being done by convicts and exiles banished from Russia, under government control, until 1917, when the revolution freed the exiles and gave them courage to promote private mining enterprises.

STANTON, EDWIN MCMASTERS (1814-1869), an American statesman, who became the famous Secretary of War in President Lincoln's Cabinet. He was born in Steubenville, Ohio. After two years of study at Kenyon College, he studied law and was admitted to the bar in 1836. In 1856 he moved to Washington, D. C., where he had considerable practice before the United States Supreme Court. He succeeded Jeremiah Black as Attorney-General in 1860. Always outspoken, Stanton made no concealment of his violent opposition to slavery, and Lincoln confidently made him Secretary of War, although he and Stanton were hardly friends. Stanton showed a genius for administration and for sure, rapid judgments, which made his conduct of his office extremely efficient. To him, almost as much as to Lincoln, and surely as much as to any general in the war, the successful outcome of the struggle may be attributed.

EDWIN M. STANTON
The only President of the United States who was ever impeached suffered that indignity because of a quarrel with Stanton.

Stanton's blunt statements, his tactlessness and his pitiless judgments made many enemies. Lincoln overlooked his faults, but after Johnson became President the two clashed in-

cessantly over reconstruction issues (see RECONSTRUCTION). It was because Johnson tried to remove his Secretary from office that the former was impeached. After the President's acquittal, Stanton resigned. President Grant appointed him Associate Justice of the Supreme Court, but a few days after the appointment Stanton died, worn out from overwork, an old man at fifty-five. The struggle between Stanton and the President is described more fully in these volumes in the biography of Andrew Johnson (see page 3162).

Consult Flower's *Edwin McMasters Stanton;* DeWitt's *The Impeachment and Trial of Andrew Johnson.*

STANTON, ELIZABETH CADY (1815-1902), an American reformer, a pioneer in the cause of woman suffrage, was born at Johnstown, N. Y. She was graduated from Emma Willard Seminary, in Troy, N. Y., and in 1840 was married to Henry B. Stanton, a man prominent in the antislavery agitation. While visiting in London she met Lucretia Mott, and it was largely through her influence that Mrs. Stanton decided to call a woman's rights convention at her home in Seneca Falls in 1848. This began her active public career, during the course of which she constantly championed equal rights for the two sexes; that is, more specifically, more intelligent divorce laws, equal rights of property and of suffrage and equal educational advantages. In 1861 she was made president of the Woman's Loyal League, and was also the first president of the National Woman's Suffrage Association, serving in that capacity from 1865 to 1893.

ELIZABETH CADY STANTON

Mrs. Stanton's lecture tours included the United States, Canada, England, France and Scotland. In 1888 she presided over the first International Council of Women held in Washington. She was the founder, and for a time the editor, of *The Revolution,* a reform periodical. A prominent feature of her life was the attention she gave to the duties of her own home, and her skill in avoiding any conflict of public work with domestic life. Many of the reforms she agitated are still unachieved, but during her lifetime she witnessed great improvement in the status of women, principally in educational lines, in matters relating to woman's legal possession of personal property, and in the struggle for equal suffrage. Her writings embrace her autobiography, entitled *Eighty Years and More,* and *A History of Woman Suffrage,* of which she was joint author with Susan B. Anthony and Mathilda Joslyn Gage.

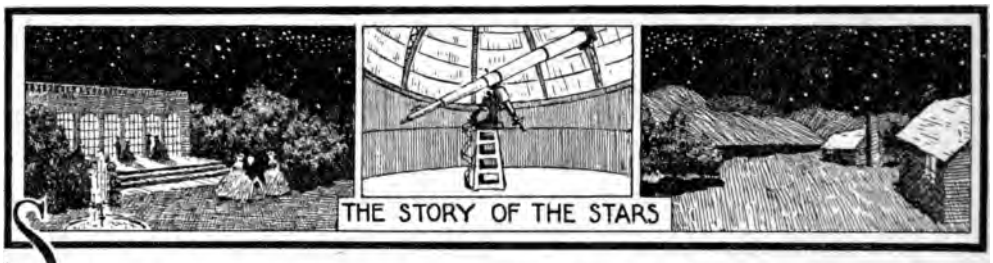
In the group of social and political reformers of the period of Mrs. Stanton's activity were such devoted women as SUSAN B. ANTHONY, MARY A. LIVERMORE, BELVA LOCKWOOD, LUCRETIA MOTT, DR. ANNA SHAW and FRANCES WILLARD. These will be found in their alphabetical order. See, also, WOMAN SUFFRAGE.

STANTON, FRANK LEBBY (1857-), a journalist and poet whose negro songs and verse of the Southern United States have been very popular. From his early youth, Stanton has been in the field of journalism. He was born in Charleston, S. C., and after receiving a common school education served an apprenticeship as a printer, at one time in the employment of Joel Chandler Harris, one of the South's most delightful writers, as an office boy.

Stanton early became associated with the press of Atlanta, Georgia, and is one of those poet humorists who edit a column of wit and satire on topics of present interest; his column in *The Atlanta Constitution* he called "News from Billville." Stanton is the author of several volumes of poetry which for its charm, simplicity and optimism is unique. If measured by the opinion of newspapers and critics, the writings of few recent American poets have been more popular, both in the United States and Canada. Among the volumes of Stanton's verse are *Songs of the Soil, Songs from Dixie, Up from Georgia* and *Little Folks Down South.* His *One Country,* an outburst of patriotism, begins as follows:

After all,
One country, brethren! We must rise or fall
With the Supreme Republic. We must be
The makers of her immortality—
Her freedom, fame,
Her glory or her shame:
Liegemen to God and fathers of the free!

After all—
Hark! from the heights the clear strong clarion call
And the command imperious: "Stand forth,
Sons of the South and brothers of the North!
Stand forth and be
As one on soil and sea—
Your country's honor more than empire's worth."



STAR, a heavenly body which appears to us as a spot of twinkling light, quaintly described by a child as "a hole in the sky." So far as known, it is of the same composition as the sun, which is itself a star.

Stars are bodies which, like our sun, are incandescent, each shining with its own light. The stars that can be seen with the naked eye number between 6,000 and 7,000, but the number actually visible at one time is rarely more than about 2,000. A powerful telescope soon shows that those which can be seen with the eye are only a small proportion of the number really existing. A telescope like the great equatorial at Yerkes Observatory would show more than 100,000,000, while even an opera glass of average quality would make visible about 100,000. Photography has recently revealed many millions of stars never before detected. From the earth all stars look more or less alike to the eye, varying principally in size and brightness. Young, an American astronomer, says, however, that stars differ among themselves in size, color and brilliancy, "as much as flies differ from elephants;" the Bible, too, uses as a comparison, "as one star differeth from another in glory."

Grouping and Naming of Stars. Stars appear to be naturally grouped in constellations, which are given names mostly drawn from Greek mythology. Sometimes the grouping of the stars suggests the name given; at other times the name does not appear appropriate or to have been bestowed for any particular reason. The stars themselves are being given special names as rapidly as astronomers can catalog them. Usually a star's name is that of the constellation in which it appears plus a Greek letter; thus *Alpha Centauri* is the first in *Centaurus*. The subject of grouping and naming is treated fully in the article ASTRONOMY, subhead *The Stars and Their Names*.

Variable Stars. Stars which appear to change their brightness, either slowly, regularly, or continually, are called variable. They may blaze out suddenly and disappear, grow bright and dull alternately, or slowly fade. Many explanations have been suggested concerning the causes of these changes. "When the stars grow old," is not as fanciful an expression as it might seem; the changes, when merely progressive, are due to age, while the periodical darkening of stars is attributed to an eclipse by some intervening opaque body.

Size of Stars. The measurement of stars is in many cases almost impossible. The apparently tiny spots yield practically no basis for calculation. It has been carefully estimated, however, by use of the spectroscope, that Algol, a bright star in the constellation of Perseus, has a diameter of 1,160,000 miles, or about 140 times the diameter of the earth. Algol has a companion star, invisible to all but the most powerful instrument, with a diameter of nearly 1,000,000 miles. The diameter of the sun is 108 times that of the earth, yet Arcturus has a diameter 100 times greater than that of the sun.

Magnitude. In respect to the degrees of brightness with which they shine, stars are divided into *magnitudes*. The human eye cannot discern stars beyond the sixth magnitude, and the largest telescopes do not reveal any lower than the fifteenth. Stars of the first magnitude shine about one hundred times as brightly as those of the sixth, and their light is perhaps a million times as intense as those of the fifteenth. From the days of the Greek astronomer Hipparchus, in the second century B. C., catalogs of stars have been compiled from time to time. The following table is a recent one, but, as estimates are being constantly revised, it must be considered subject to change:

Stars of	first	magnitude	20
"	second	"	65
"	third	"	190
"	fourth	"	425
"	fifth	"	1,100
"	sixth	"	3,200
"	seventh	"	13,000
"	eighth	"	40,000
"	ninth	"	120,000
"	tenth	"	380,000
"	eleventh	"	1,000,000

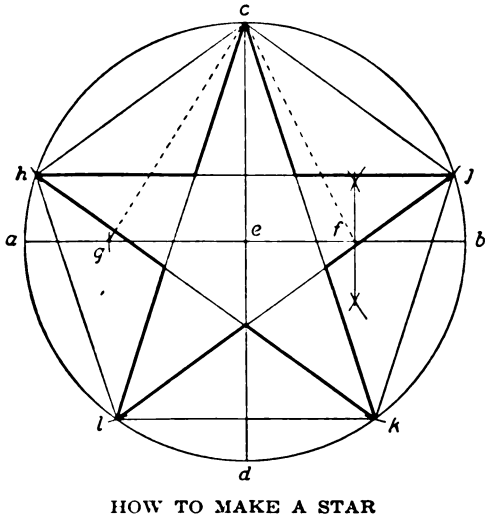
Stars of twelfth magnitude	.....	3,000,000
" " thirteenth "	.....	9,000,000
" " fourteenth "	.....	27,000,000
" " fifteenth "	.....	80,000,000

Among the stars of first magnitude are Sirius, Canopus, Rigel and Aldebaran.

Mariner's Stars. "Steering by the stars" has become a common expression, and sailors by careful observation of the position of certain well-known stars are able to verify the correctness of or error in the courses they are steering. In the northern hemisphere the familiar Dipper acts as guide to mariners and to hunters in the forests of the North. Two of its stars point to the North Star; that point ascertained, the other points of the compass are easily located. In the southern hemisphere the Southern Cross serves the same purpose. Many a sailor, storm tossed, his vessel driven miles out of its course, has been cheered and saved by a rift in the clouds which permits him a view of the Dipper or of the Southern Cross.

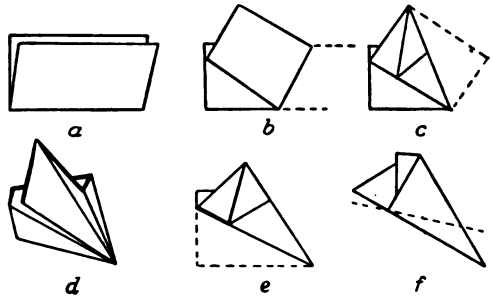
How to Make a Star. The accompanying diagram shows a geometrical drawing which may serve as a pattern for a five-pointed star. The drawing can be constructed as follows:

Draw a four-inch circle. Draw the horizontal and vertical diameters *a b* and *c d*. Mark the point of intersection *e*. Bisect *e b* and



HOW TO MAKE A STAR
The figure is explained in the text.

mark the point of intersection *f*. With *c* as a center and *c f* as a radius, transcribe an arc cutting *a c*, marking the point of intersection *g*. With *g c* as a radius and *c* as a center, describe two arcs cutting the circumference at *h* and *j*. With *h* and *j* as centers and the same radius, describe arcs cutting the circumference at *k* and *l*. Form a star by connecting *c* and *l*, *c* and *k*, *h* and *k*, *l* and *j* and *h* and *j*.



HOW A STAR MAY BE CUT FROM PAPER
Explanation appears in the text.

The six drawings of the second diagram show how a star may be cut out quickly by folding. Cut on the dotted line in *f*, which shows the reverse of *e*.

These directions will be especially helpful to a class desiring to make a flag (see subhead *How to Make a Flag* in FLAG article, page 2196).

Consult Young's *Lessons in Astronomy;* Newcomb's *The Stars: A Study of the Universe;* Chambers' *Story of the Stars.*

Related Subjects. In addition to above references see list of related subjects at the close of the article ASTRONOMY.

STARCH, a soft, white, glistening powder, originating within the living cells of plants. Starch is made up of hydrogen, carbon and oxygen, and is therefore a carbohydrate. It is one of the most important foods known to man, and is an active producer of energy and heat in the body, through which it circulates in the form of grape sugar, a chemical change resulting from digestion. It is highly nutritious, if taken in combination with other foods.

The Plant as a Manufacturer of Starch. Starch making is confined to those plants which contain a green coloring matter called chlorophyll, and takes place only under the direct influence of sunlight and when water and carbon dioxide are both present. Just how the chlorophyll bodies use the water and carbon dioxide to make starch is not known, for the process is understood by neither the chemist nor the botanist. Professor George L. Goodale of Harvard University has made the following interesting comparison of the starch-making leaf to any mill—for ease of comparison, a flour mill:

	The Mill	Leaf Cells
Raw Material:	Wheat	Carbon dioxide, water
Energy:	Steam, electrical or water power	Sunlight
Manufactured product:	Flour	Starch
By-product:	Bran, etc.	Oxygen

The reserve starch made by the leaves and other green parts of the plant is changed to some other form and carried to the storage region of the plant to be reconverted into starch. The underground stems and roots, and the stems, pith and seeds of various plants are important reservoirs for storing starch; it is also found in pulpy fruits and in the juice of most vegetables. It is especially abundant in wheat, potatoes, and in such starchy foods as arrowroot and sago.

Characteristics. Under the microscope starch is seen to consist of minute, oval or pear-shaped grains, each of which contains a central portion, or nucleus, and a series of envelopes, arranged about the nucleus and having a common center. The size of the grains and the arrangement of layers vary in different plants, which enables one to determine the source of any particular starch. Starch will not dissolve in water, alcohol or ether, but in boiling water the grains swell and break up, forming a stiff paste, when cooled.

An infallible test for starch is the addition of tincture of iodine to the starch paste, which produces a deep blue color. This color disappears if heat is applied. The iodine test is useful in determining the presence of starch in foodstuffs. If starch is heated dry it will change to a yellowish substance called dextrin. Dextrin subjected to heat and an acid or ferment is converted into dextrose, or grape sugar, which is contained in ripe fruit, honey and sweet wine. The starch in bread dough is by fermentation converted into dextrose, which is further changed into alcohol.

How Starch Is Prepared for Use. Starches are divided into two general groups—those used for food and those used in laundering, in the finishing of certain textiles and as a thickening material in calico printing. Some starches come under both groups. Starch is also used indirectly in the preparation of dextrin and starch sugar, potato starch being the principal variety employed for this purpose. The chief food starches are arrowroot, sago and tapioca; the preparation of these is described under their respective titles.

Cornstarch, widely known and used, is the starch of Indian corn, or maize. The starch is first separated from the grain by steeping for a long time in water; it is then crushed between cylinders and strained through a sieve. The milky fluid containing the starch grains is allowed to flow over a series of surfaces having a slight inclination, and in this process the heavier grains are deposited, while the lighter particles are carried into settling tanks. The deposit in the tanks is purified by a series of straining and settlings, the final product being dried by artificial heat until it forms the fine white flour sold as cornstarch.

Wheat, rice and potatoes are extensively used in making starches for industrial purposes, rice starch being preferred for use in the laundry. Wheat starch is separated from the grain by two methods—fermentation and a mechanical process. In the former process whole wheat or wheaten meal is soaked in water for the purpose of softening the wheat grains and causing them to swell. The grains are then reduced to a pulp, and a thick fluid is formed by mixing the pulp with water. The mixture is then placed in tanks and subjected to fermentation, after which the starch is separated in a washing drum, and purified by repeated washing and settling, being finally dried by gentle heat.

By the mechanical process a stiff paste is made by kneading wheaten flour. This is washed over a fine sieve, in the course of which the starch is separated from the gluten, the latter remaining in the sieve as an elastic, sticky mass. The starch is then purified and dried. The gluten mass is utilized in various ways, notably as a food for patients suffering with diabetes and as an ingredient of macaroni.

Potato starch is made by steeping and washing the potatoes, and then rasping them down to a fine pulp, which is deposited in water in the form of raw starch. The starch is washed over fine sieves so the impurities and pure starch may be separated; only the latter passes through the meshes of the sieve. Potato starch is widely used as an adulterant and as a substitute for the pure food starches.

Production. Starch products valued at about $16,000,000 are made annually in the United States. Illinois is the leading state in value of output, being followed in order by Iowa, New Jersey and Indiana. The town of Argo, Ill., a suburb of Chicago, was founded in 1905 for the sole purpose of starch making. It is the world's largest center for this industry. The second

largest center is at Oswego, N. Y., although as a state New York ranks fifth. B.M.W.

Related Subjects. The reader is referred to the following articles in these volumes:

Carbohydrates	Digestion
Chlorophyll	Yeast

STAR CHAMBER, an English tribunal which met at Westminster and which is said to have taken its name from a room where the meetings were held, which was decorated with gilt stars. It is supposed to have originated in the ancient exercise of judicial functions by the king's council. Until the fifteenth century little is known of it, but in 1488 Henry VII reorganized it and gave it new powers, or, according to another theory, inaugurated a totally new court. His statute gave to a commission composed of a chancellor, treasurer, keeper of the privy seal, chief justices, or in their absence, to other justices, a bishop and a temporal lord, the right to act as a court of trial for all misdemeanors of sheriffs or of jurors and for all riots or unlawful assemblies. The trials were without jury, and any sentences short of death might be passed.

During the time of the Tudors this court, arbitrary as it was, was of real service in reducing to order the great nobles, who when brought before any ordinary court often succeeded in intimidating the jury. Many abuses crept into its proceedings in the course of time, however, chief among them the custom of forcing prisoners by torture to confess. Under James I and Charles I the hatred felt against the Star Chamber greatly increased, and in 1641 the Long Parliament abolished it.

The term *star chamber* is used to-day to designate secret meetings of officials or politicians in which plans are laid for their personal aggrandizement rather than for the public good.

STAR'FISH, a family of interesting sea animals having the general appearance of a five-pointed star. The "points" are five arms which radiate from a central disk. Starfish belong to the same branch of the animal kingdom as sea urchins and sea lilies, the *echinoderms* (which see). This word means *spiny-skinned,* and refers to the prickly covering of these animals. The tough, leathery skin of the starfish is beset with limy spines arising from plates developed just under the skin. On the under surface of the disk is a mouth, and on the same surface of each arm there is a groove beginning at the mouth and ending near the tip of the arm. Along the grooves are double rows of tubelike "feet," some of which are used as organs of locomotion and others as sense organs of smell. At the tip of each arm there is a small eye protected by a circle of spines.

Starfish have well-organized nervous, digestive and circulatory systems. The stomach

(*a*) The most common Southern Pacific form; (*b*) found near Panama; (*c*) common near the coast of Massachusetts.

begins at the mouth and occupies nearly all of the central disk, as well as a small portion of each arm. The food of these animals consists chiefly of oysters, mussels, clams and snails. They prey upon oysters to such an extent that their depredations amount to a serious loss in some localities. It is estimated that the oyster beds of Rhode Island suffered a loss of $100,000 in one year from starfish. To reach the soft body of the oyster the starfish must force open the valves of the shell. This it does by pulling upon them with its tube feet. The oyster can withstand the strain for a time, but finally its muscles must relax. When the shell drops open the starfish ejects its stomach through its mouth opening, turning the organ inside out and applying it to the soft body of its victim. Digestion and absorption then take place.

Consult Romane's *Jellyfish, Starfish and Sea Urchins.*

STARK, JOHN (1728-1822), an American military leader, conspicuous in the Revolutionary War. Stark was a true patriot, for in 1776 he pledged his fortune to the soldiers, to induce them to reënlist. He was born in Londonderry, N. H., and while a boy was captured by the Indians, who styled him "the young chief." He fought in the French and Indian War, and at the beginning of the Revolution was appointed colonel. He was with Washington at Trenton and Princeton, then retired temporarily from service. Called again to take command of the New Hampshire troops, at Bennington, in August, 1777, Stark attacked the enemy with the order—"There they are, boys. We beat them to-day or Mollie Stark's a widow!" In this battle the second reënforcement of the enemy was defeated like the first, and the victory paved the way for the surrender of Burgoyne at Saratoga. Until the close

of the war he served at the head of various departments. Stark was rewarded by thanks from Congress and the rank of brigadier-general, conferred in October, 1777.

STARLING, a song bird related to the blackbird, common throughout the Old World. It is black in color, glossed with greenish, purple or lilac, and has its feathers tipped with buff. The *common starling* is a favorite bird in England, where it is resident for most of the year, retiring only in the coldest weather to Southern Europe or to North Africa. It is seen in large flocks even during the nesting season, and is invaluable to farmers on account of the numbers of insects it devours; in the fruit season, however, it eats so many berries, cherries and even apples and pears that it is considered somewhat of a pest at that time. It nests about buildings or in holes in cliffs. The eggs are four to seven in number and a light greenish-blue in color. About sixty common starlings were liberated in Central Park, New York, in 1890, and have spread to all parts of the city and surrounding country. Bird lovers of that section are doubtful as to the benefit of these newcomers because of their quarrelsome habits, which are driving out the native song birds.

THE STARLING

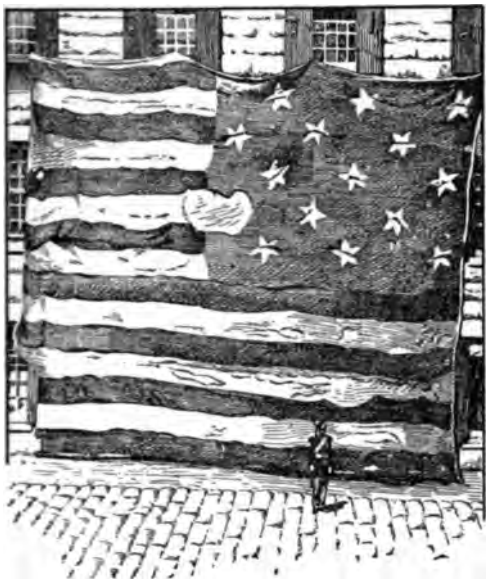
STAR OF BETHLEHEM, a small, hardy plant of the lily family, the flowers of which have the form of a six-pointed star. The petal-like sepals are white, but have green stripes on the outside, a color scheme repeated in the leaves, which are green with white stripes. The star of Bethlehem is a native of Italy, but has become a common garden plant in America. The flower stalk springs from a coated bulb.

STAR ROUTES, the name given to designated routes over which mail is transported, under private contract, in the United States, by messenger on foot, on horseback or by wagon. The name *star routes* was applied because in government records all such routes are marked by an asterisk, or star. Many people live in districts remote from railroads; this has been particularly true in the West, and in many sections the condition largely prevails to-day. Routes over railroads or by steamboat are not called star routes. It should be noted also that rural free delivery routes are not star routes. A star route is one in which mail is transported in bulk from a point where it leaves a train or steamboat to designated post offices, there to be distributed to individuals addressed. There are many star routes in the United States, but with the extension of railroad facilities they are constantly decreasing in number and in importance.

Star Route Frauds. This term was applied to irregularities in the postal service on star routes, discovered in the last days of the administration of President Hayes. Fraudulent petitions were forwarded to the postoffice authorities in Washington, urging the creation of new star routes and furnishing "estimates" for carrying the mails over them at prices far above the necessary cost of the service. These estimates were allowed, and the money fraudulently derived therefrom was divided among the parties to the plot. The guilty parties were finally exposed and the conspiracy was broken up in the administration of President Garfield. T. J. Brady, second assistant Postmaster-General, and S. W. Dorsey, a Senator from Arkansas, were tried for complicity in this plot, but were acquitted. William P. Kellog, a Senator from Louisiana, was also indicted in this connection, but his case was not tried. It is estimated that the plot, if successful, would have defrauded the government of half a million dollars a year. It is said that only one person connected with these frauds was ever punished, and he was believed to be innocent.

STAR-SPANGLED BANNER, The, an American patriotic song, written by Francis Scott Key. After the burning of Washington, D. C., by the British soldiers, in August, 1814, Dr. William Beanes of Upper Marlborough, Md., threw three British refugees into jail, and for this he was arrested by an English regiment and taken as a captive aboard a warship in Chesapeake Bay. John S. Skinner of Washington, and Key, then a young attorney in the District of Columbia, were granted permission by Secretary of State James Monroe to intercede for the doctor, and these two boarded the vessel just as it was preparing to bombard Fort McHenry, the chief protection of Baltimore. The British officers agreed to release Beanes, but refused to allow the two Americans to leave the vessel until after the battle, lest they should tell the plans to the patriots on land.

On Tuesday, September 13, 1814, the bombardment began, continuing that day and almost all night. To Key and his companions it seemed impossible that the fort could survive the attack, as its guns were small and its



"THE STAR-SPANGLED BANNER"
The illustration is a drawing of the original flag which floated over Fort McHenry.

defenders were few. All night they walked the deck in anguish, and even when dawn came could not discover the outcome because of haze and smoke. Suddenly, at seven o'clock, a rift in the mist showed for a moment the flag gleaming over the walls. Thrilled by the sight, Key wrote the greater part of the poem in a few minutes on the back of an unfinished letter, and completed the stanzas that night in a Baltimore hotel.

The next morning the poem was printed on handbills, and during that day Key's brother-in-law suggested that it be set to the old English drinking tune, *Anacreon in Heaven,* which was already familiar to Americans as the air for a political song entitled *Adams and Liberty.* A few days later an actor named Ferdinand Durang first sang it in public at Baltimore. The composition immediately became popular, was played at the Battle of New Orleans, and is now played each evening at flag lowering in every American fort and garrison and on every American battleship throughout the world. The words of the song appear on this page.

The United States government keeps a flag floating continually over Key's grave at Fred-

The Star-Spangled Banner

[The third stanza is omitted.]

Oh! say, can you see, by the dawn's early light,
What so proudly we hailed at the twilight's last gleaming?
Whose broad stripes and bright stars, thro' the perilous fight,
O'er the ramparts we watched were so gallantly streaming?
And the rockets' red glare, the bombs bursting in air,
Gave proof thro' the night that our flag was still there.
Oh! say, does the star-spangled banner still wave
O'er the land of the free and the home of the brave?

On the shore, dimly seen thro' the mist of the deep,
Where the foe's haughty host in dread silence reposes,
What is that which the breeze, o'er the towering steep,
As it fitfully blows, half conceals, half discloses?
Now it catches the gleam of the morning's first beam,
In full glory reflected, now shines on the stream;
'Tis the star-spangled banner. Oh! long may it wave
O'er the land of the free and the home of the brave!

Oh! thus be it ever when freemen shall stand
Between their loved homes and the war's desolation;
Blest with vict'ry and peace, may the heav'n-rescued land
Praise the Pow'r that hath made and preserved us a nation.
Then, conquer we must, when our cause it is just,
And this be our motto, "In God is our trust."
And the star-spangled banner in triumph shall wave
O'er the land of the free and the home of the brave.

other small wares." In the Revolutionary War Staten Island was the scene of much fighting. See map, page 4205.

STATES-GENERAL, a legislative assembly in France which existed from 1302 until 1789. The term is also applied to the present Dutch Parliament. The States-General of France was composed of representatives of the clergy, the nobility and the common people, who constituted what was known as the Third Estate. Until the States-General of 1484, the representatives of the clergy and the nobility were summoned personally by the king, while the representatives of the Third Estate were elected by the people they represented. After 1484, however, the representatives of all three classes were elected by vote.

The States-General did not meet at regular intervals, but was called together by the king in times of emergency, whenever he needed advice or money or moral support. Direct power belonged exclusively to the king, but the influence and indirect power of the States-General were at times very great. By the year 1614, however, the power of this assembly had declined to almost nothing. When it was again summoned in 1789, the representatives of the Third Estate, who had been growing very powerful, made the famous decision which led to the French Revolution (which see), that the members of the States-General should constitute a national assembly with full sovereign powers, to be known as the National Constituent Assembly.

The States-General of the Netherlands, an assembly in which each province had one representative and one vote, was in existence in The Hague from 1593 until 1796, when it, too, became a National Assembly. The present Dutch Parliament, however, bears the name States-General.

STATES' RIGHTS, in American political history, a term used to characterize the view of those who held that the several states, in uniting to form a central government, surrendered none of their sovereign powers. The issue between the followers of Hamilton, who urged a strong central government, and the followers of Jefferson, who wished to maintain a loose federation of sovereign states, was debated at the very foundation of the United States; it was to remain an issue of importance until the War of Secession. Out of the doctrine of states' rights grew the doctrine of the rights of secession; this was the extreme and logical assertion of the sovereignty of the Southern states. Their failure to uphold their claims resulted in the removal of states' rights as a political issue of importance. In a less drastic form, the cleavage between the followers of Jefferson and the adherents of Hamilton may still be discerned in much political writing and speaking.

STATICS, *stat'iks,* a branch of dynamics. Dynamics treats of the properties of matter in motion and is divided into two branches—*statics* and *kinetics.* Statics deals with conditions under which there is no change of motion of material bodies when they are acted upon by various forces. When two or more forces so act upon a body as to produce no change of motion they are said to be *in equilibrium.*

Related Subjects. The following articles in these volumes should be read in this connection:

Composition of Forces	Mechanics
Dynamics	Physics

STATUARY, *stat'u a ri,* **HALL,** a large, circular room in the Capitol at Washington, on the main floor, directly beneath the great central dome of the building. Until 1857 it was the chamber of the House of Representatives. By act of Congress in 1864 it was created a memorial hall, to which each state may contribute two statues to honor the men or women whom it considers worthy of commemoration. The act reads as follows:

> The President is hereby authorized to invite each and all the States to provide and furnish statues, in marble or bronze, not exceeding two in number for each State, of deceased persons who have been citizens thereof, and illustrious for their historic renown or from distinguished civic or military services, such as each State shall deem worthy of this national commemoration; and when so furnished the same shall be placed in the old hall of the House of Representatives, in the Capitol of the United States, which is hereby set apart, or so much thereof as may be necessary, as a national statuary hall, for the purposes herein indicated.

This hall, which now echoes to the footsteps of the sight-seer, once rang with the eloquence of great men. If its walls could speak, they might tell of many historic events which they had seen. Here Madison was inaugurated as President in 1809 and in 1813, and Monroe in 1821.

Here the House of Representatives elected John Quincy Adams as President in the momentous election of 1825, and twenty-five years later Fillmore took the oath of office on the day after Zachary Taylor died. In this hall Henry Clay, as Speaker, presided for many

years over bitter debates on the War of 1812, on the Bank of the United States and the tariff. Here Webster, Calhoun, Douglas and Lincoln, among other great Americans, received their initiation into the nation's public life. These and other men discussed the issues which finally led to the War of Secession.

It is entirely fitting that this chamber should now contain the statues of some of the great men of a united nation. Each state, through its legislature, may select two citizens to be honored by statues in marble or bronze. Some of the states have as yet selected only one man, and a few are not yet represented. The only woman chosen is Frances Willard, whose statue was placed in the hall by Illinois in 1905. A complete list of all the statues, with the dates on which they were installed, is given below:

STATE	NAME	DATE	STATE	NAME	DATE
Alabama	J. L. M. Curry	1906	New Jersey	Richard Stockton	1886
Connecticut	Roger Sherman	1872	"	Philip Kearny	1875
"	Jonathan Trumbull	1872	New York	Robert R. Livingston	1874
Idaho	George L. Shoup	1909	"	George Clinton	1873
Illinois	James Shields	1893	Ohio	James A. Garfield	1885
"	Frances E. Willard	1905	"	William Allen	1887
Indiana	Oliver P. Morton	1899	Pennsylvania	J. P. G. Muhlenberg	1881
"	Lew Wallace	1909	"	Robert Fulton	1881
Iowa	James Harlon	1909	Rhode Island	Nathanael Greene	1869
Kansas	John J. Ingalls	1904	"	Roger Williams	1870
Maine	William King	1877	South Carolina	John C. Calhoun	1909
Maryland	Charles Carroll	1901	Texas	Stephen F. Austin	1904
"	John Hanson	1901	"	Samuel Houston	1904
Massachusetts	Samuel Adams	1873	Vermont	Ethan Allen	1875
"	John Winthrop	1872	"	Jacob Collamer	1879
Michigan	Lewis Cass	1889	Virginia	George Washington	1908
"	Zachariah Chandler	1913	"	R. E. Lee	1908
Missouri	Francis P. Blair	1899	West Virginia	John E. Kenna	1901
"	Thomas H. Benton	1899	"	Francis H. Pierpont	1903
New Hampshire	John Stark	1894	Wisconsin	James Marquette	1895
"	Daniel Webster	1894			

STATUTE, *stat'ute,* a written enactment of an authorized lawmaking body. *Statute law* is another term for *written* law, and is to be distinguished from *unwritten,* or *common,* law. The bodies by which statute law is enacted are known variously as Congress, Parliament, Assembly, Legislature, etc. The ordinances of city boards of aldermen, or councils, are examples of local statute law, as are the regulations adopted by authorized boards of health and sanitation. These are called *ordinances,* also. The nature of statute law and its relation to other forms of law are discussed in these volumes under the heading LAW.

STAUNTON, *stawn'tun,* VA., the county seat of Augusta County, situated in the northwestern part of the state, 135 miles northwest of Richmond and 190 miles southwest of Washington. It is served by the Baltimore & Ohio and the Chesapeake & Ohio railroads. In 1910 the population was 10,604; it was 11,654 in 1916 (Federal estimate). The area is nearly three square miles. The city is the seat of Staunton Military Academy, Mary Baldwin Seminary and Stuart Hall, and it has the Western State Hospital for the Insane and the Virginia School for the Deaf and Blind. Prominent buildings are the city hall, courthouse and the Masonic Temple. Near by are cemeteries with graves of Confederate and Union soldiers killed in the War of Secession. The city has Gypsy Hill and Highland parks. Staunton is in a rich agricultural valley between the Alleghany and Blue Ridge mountains. Organs, overalls and flour are among the manufactures. The settlement was made near the present site of the city in 1731. The town was incorporated in 1761 and it became a city in 1870. It is the birthplace of Woodrow Wilson. G.B.A.

STAVANGER, *stah'vang er,* an important seaport of Norway, the capital of the amt (administrative division) of Stavanger. It is situated on the southwestern coast, on Stavanger Fiord, an inlet of the North Sea. Christiania is about 190 miles to the northeast. Stavanger is a very old town, built mainly of wood, and it is noted for its great merchant fleet. The foreign trade in fish, timber and marble is extensive, and there are shipyards, machine shops, cotton factories and woolen mills. An ancient cathedral, built in the Norman style in the thirteenth century, is a feature of interest. Population in 1910, 37,261.

STEAD, *sted,* WILLIAM THOMAS (1849-1912), an English journalist, born at Embleton. He received a little schooling at Wakefield, but at the age of fourteen began work as a clerk in a store at Newcastle-on-Tyne, reserving his spare time for education. When he was twenty-two years old he became editor of a small paper, *The Northern Echo,* at Darlington, and was so successful that in 1880 he was offered the position of assistant-editor of the *Pall-Mall Gazette* in London, and three years later became its editor-in-chief. In that paper he began a campaign for laws to protect women and children from outrages, and in 1885 wrote so bitterly of conditions in *The Maiden Tribute of Modern Babylon* that he was imprisoned in London for three months for libel. However, he had the satisfaction that year of seeing the laws passed for which he had striven.

In 1890 he founded the *English Review of Reviews,* in 1891 the *American Review of Reviews* and in 1894 the *Australasian Review of Reviews.* He did a work of genuine usefulness for British education when he began, in 1895, the publication of the *Masterpiece Library of Penny Poets, Novels and Prose Classics.* A visit to the czar of Russia in 1898 made him a zealous advocate of peace and his weekly paper, *War Against War,* together with numerous pamphlets urging arbitration, did much to direct public sentiment toward a demand for universal peace.

About 1905 he became a convert to spiritualism and four years later published a statement that he was receiving daily messages from his dead son. Shortly before his death he announced his intention of establishing in New York a spiritualistic station, much like a telephone central, where persons could deposit or receive communications connected with the other world. In the pursuance of this plan he sailed for the United States on the first voyage of the *Titanic,* and met his death with nearly 1,500 others when the vessel foundered off the Grand Banks, near Newfoundland, April 15, 1912. Among his most important books are *The Truth about Russia, A Study of Despairing Democracy* and *The United States of Europe.* A book which created an immense amount of discussion was *If Christ Came to Chicago;* in it he gave a vivid description of criminal tendencies in Chicago. M.T.

STEAM, *steem.* If you ask the average person whether he has ever seen steam he will answer "Yes." But he will be mistaken, for steam is colorless and invisible. Sometimes in watching the cloud that comes from the spout of a teakettle of boiling water you may notice that the vapor which is mistakenly called steam begins an inch or so from the spout. In the seemingly vacant space is the real steam, which is water transformed into gas; the visible cloud is water changed back into tiny particles of liquid by the cooler temperature of the air.

Steam may be caused either by evaporation or by boiling, but almost always hot steam is meant when the word is used. When water is heated to the boiling point, 212°, bubbles of steam begin to rise through it. Until all the liquid has become gas the temperature will remain at the boiling point. Meanwhile five and one-third times as much heat will have been expended as was necessary to raise the temperature from the freezing to the boiling point. This heat is known as the *latent heat* of steam, because it will be given off again when the gas is condensed to water.

Steam occupies more space than the water from which it comes. Just at the moment when boiling ceases, the gas is 1,644 times as great in volume as the former liquid. At this stage it is called *saturated steam.* If heated further its temperature and volume continue to increase, and it is known as *superheated steam.* This tendency to expansion makes possible the steam engine. *Wet steam* supports particles of water still in liquid form; *dry steam* contains only gas.

Related Subjects. Further information as to the nature of steam and its ability to do work may be found in the following articles:

Boiling Point
Evaporation
Steam Engine
Steam Hammer
Steam Shovel

STEAM ENGINE. No other period in the world's history has witnessed so many changes as the last 150 years. If Shakespeare had revisited England after a lapse of a century and a half he would have found everything very much as it was in his own lifetime, except for changes in fashion and politics, lesser differences in architecture, and strange talk about "the colonies." But now, after 300 years, he would seem to be in a new world. He would find huge cities where small towns had been, and in them he would see thousands of men and women busy in factories humming with the whir of steam-driven machines which unceasingly devour the cotton and wool, the grain and ore brought from the corners of the earth in steam-propelled ships and steam-drawn trains. At morning and night he could watch

WATT DISCOVERING THE POWER OF STEAM
From the painting by David Neal.

the toilers riding to and from their work in cars moved by the force once known to man only in the lightning, but now generated for his service by the all-powerful steam. And he would learn that in its short life the steam engine had transformed not merely his own island and the neighboring countries, but even lands which at his day no white man had seen.

The principle of the steam engine is simple. Energy is never lost; it may be changed from one kind of energy to another, or it may remain *latent*, or sleeping, for countless ages, but it is still capable of doing work. So man takes coal, in which energy has been stored by nature, burns it to bring out its energy in the form of heat, and places over the fire a boiler

of water to absorb the heat. When the water reaches the boiling point its molecules begin to move apart, driven by the energy that was in the coal but is now in a form in which, in its efforts to expand the steam, it will turn wheels for man.

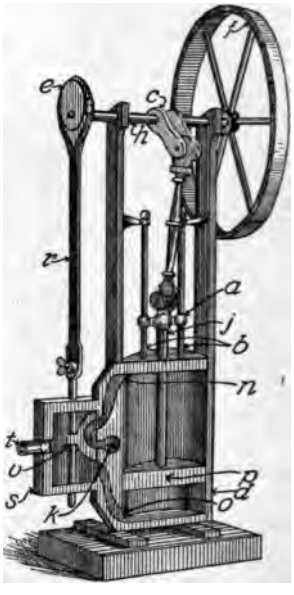
A century before the Christian Era there was in Alexandria a man named Hero who experimented with steam and constructed a device like a Barker's mill, but whirled by steam instead of water (see BARKER'S MILL). Nearly 2,000 years elapsed before the science of steam engineering advanced, and then, in the first year of the seventeenth century, an Italian named Della Porta wrote a book which told how to build a fountain whose waters would bubble up from the pressure of steam, and stated that when the steam cooled it would condense and draw up more water from below. Upon this power of condensation inventors relied as much as upon expansion, until the nineteenth century. The first engine of actual service, patented in England in 1698, was a pump which was but an elaboration of Della Porta's fountain, and the Newcomen engine, the best known when James Watt began his experiments in 1763, made no attempt at all to utilize the expansive power of steam.

Probably most people believe that James Watt was the inventor of the steam engine, and millions are familiar with the picture which shows him in boyhood, watching the steam clouds from the kettle. But Watt was only the improver, not the inventor. What he accomplished for the world was to reduce the cost of operating a *condensing* engine and to make it practical for other things than pumping.

The Newcomen engine set Watt to thinking, because it consumed an enormous quantity of steam, hence large amounts of fuel. It had a cylinder and a piston (see the illustration for explanation of these terms). The piston rod hung from one end of a beam and the weight to be lifted was suspended from the other end. The beam was pivoted at the center so that, like a seesaw, one end went up when the other end went down. Steam was admitted below the piston, whereupon the counterweight pulled the piston up. Cold water was then injected into the cylinder, so that the steam condensed and made a partial vacuum beneath the piston. The top of the piston was open to the air, which of course exerted a pressure of nearly fifteen pounds to the square inch on it, and when the vacuum was created beneath it, forced it down.

Watt saw that the alternate heating and cooling of the cylinder required large quantities of otherwise unnecessary heat. So he devised an engine in which the condenser and the cylinder were separate, and the latter always remained hot. As a result, three-fourths of the fuel cost for steam engines was eliminated.

Watt took out his first patents in 1769, and from that date we count the era of steam. He continued to make improvements on engines, perhaps the most important of which was the introduction of the principle of double action, in which steam is used first on one side of the piston, then on the other, as in the engine shown in the illustration. He also learned to shut off the steam when the cylinder was only partly filled, relying on expansion to complete the stroke. But he never experimented in the use of high-pressure steam; his own pressures were not much greater than the fifteen pounds per square inch of the air, while to-day pressures of over 1,000 pounds are practical and are frequently employed.



A SIMPLE STEAM ENGINE

Steam comes from the boiler through the pipe *t*. If the slide valve *v* is in the position shown, steam rushes through the port *o* into the cylinder *d*, forcing up the piston *p*, thus turning the crank *c* and supplying power to the flywheel *f*. As the piston rises, the contents of the cylinder are expelled into the exhaust port *k*, from which they can escape to a condensing chamber or to the outer air. The turning of the shaft *h* revolves the eccentric *e* at end of shaft, which thrusts the rod *r* down and moves the slide valve to the lower end of the steam chest *s*, so that the port *n* receives steam to force the piston down again, and the port *o* is connected with the exhaust. The crosshead *a*, sliding on the guide bars *b*, keeps the piston rod *j* in a straight line.

The two most radical improvements in steam engineering since Watt's day are the introduction of the compound engine and of the turbine. In the former, high-pressure steam does work in one cylinder, then passes to another, or even to a third and a fourth. The turbine is described in these volumes. C.H.H.

Consult Whitham's *Steam Engine Design;* Spangler's *Elements of Steam Engineering.*

Related Subjects. The following articles should be read in this connection:

Governor	Steam
Horse Power	Turbine Wheel
Injector	Watt, James

STEAM HAMMER. The steam hammer was invented by James Nasmyth in 1839, and immediately revolutionized all industries in which heavy forging was necessary. The Nasmyth hammer, as it was originally called, was raised by steam admitted into a cylinder beneath it. When raised to the required height the steam was allowed to escape and the hammerhead fell by force of gravity. The head might weigh 100 pounds or as much as 100 tons. In the modern steam hammer, steam is admitted alternately above and below the hammerhead, the pressure of the steam from above adding to the force of the downward stroke. So perfect is the control of these mighty hammers that a blow with a force of hundreds of tons may be given or one so gentle as to crack a nut without injuring the kernel. Electrically-operated hammers are coming more and more into favor, and can be made as powerful as the largest steam hammers.

STEAM'SHIP. See SHIP.

STEAM SHOVEL, *shuv''l,* a large scoop operated by steam power. The scoop, or bucket, is attached to a beam which can be moved in any direction and raised and lowered at will, power being applied from a hoisting engine. The bucket is of iron or steel, with a capacity of from half a cubic yard to five cubic yards. It has teeth arranged along the front so as to cut into earth or loose rock. The bottom is hung on a hinge, so that when a catch is released, the load may be emptied instantly. The method of operation is quite simple. The dipper is lowered to the ground and driven forward and upward with a powerful sweep, gathering earth and rock as it goes. The beam is then swung into any desired position, and the shovel emptied into cars or wagons, which remove the earth.

Commonly all the parts of a steam shovel are mounted on a movable car. The great steam shovels with which the Panama Canal was excavated are capable of handling from four to five thousand cubic yards of rock or ore in a day. Steam shovels are extensively used in digging and loading ore in the iron mines of the Great Lakes region and for digging canals and cuts.

STEARIC ACID, *ste air'ik as'id,* a solid, fatty acid which, when combined with glycerine, forms *stearin,* an important constituent of fats. See STEARIN.

STEARIN, *ste'a rin,* a combination of stearic acid and glycerine, is the chief ingredient in mutton suet, beef tallow and certain vegetable fats, such as palm oil. When crystallized, stearin forms pearly, waxlike scales, having neither taste nor odor, soft to the touch and not greasy. It cannot be dissolved in water, but is soluble in ether and hot alcohol. When treated with superheated steam it is resolved into its component parts—glycerine and stearic acid. When stearin is boiled with alkali the stearic acid combines with the alkali to form soap, and the glycerine is separated. Stearin is prepared for practical use from beef suet, cottonseed oil and other fats. It yields an oil employed in the manufacture of butterine.

STEATITE, *ste'a tite,* a soft rock, composed chiefly of talc, and having a soapy or greasy feel. It ranges in color from light gray to almost black. Steatite is easily sawed into slabs and was formerly used in the manufacture of stoves in which wood was used for a fuel. The French chalk used by tailors is made from a white variety of steatite. In localities having cold winters small blocks of steatite are used for foot stones, because they hold the heat for a long time. In New England these stones are called *freestones.* Because of its peculiar oily feel, steatite is often called *soapstone.*

STED'MAN, EDMUND CLARENCE (1833-1908), an American poet and critic, born in Hartford, Conn. He studied at Yale, and became editor of the Norwich *Tribune* in 1852, later was connected with several other papers, serving on the New York *Tribune* and as a war correspondent for the New York *World* during the War of Secession. In 1869 he entered on a business career as a banker and broker, and retired from active life in 1900.

But his chief interest was always in literary work. *The Diamond Wedding,* a satire on society in verse, first attracted general attention to him. His *Alice of Monmouth* is the best narrative poem called out by the War of Secession, but perhaps the best known of his verses is *Pan in Wall Street.* For twenty years Mr. Stedman devoted himself to critical writings, but in his last years returned to poetry. *Victorian Poets* and *Poets of America,* his first critical works, he supplemented by *A Victorian Anthology* and *An American Anthology.* He

aided in the preparation of an eleven-volume *Library of American Literature* and edited, with George E. Woodberry, the *Works of Edgar Allan Poe.*

STEEL, a variety of iron that contains less carbon than cast or pig iron, and more than wrought iron. Steel is superior to other forms of iron for many purposes, since it is more elastic, stronger and capable of being tempered to various degrees of hardness. Steel is made by burning the carbon out of pig or cast iron, or by burning carbon into wrought iron. Three varieties of steel are recognized, according to the percentage of carbon in the metal, namely, soft or mild steel, medium steel and hard steel. But steel is generally named after the process of its manufacture.

Crucible Steel. The finest of steel, such as that used in razor blades and watch springs, is a product of the crucible process. Bars of wrought iron are placed in retorts of clay or graphite with layers of charcoal, and are melted in furnaces. Other ingredients, the chief of which is manganese, are often added. The molten iron takes up a certain portion of carbon, and when it is allowed to harden in ingots, cast steel is produced. Crucible steel is the highest grade of steel made, and it is used for making tools and in other fine mechanisms. For this reason it is sometimes called *tool steel.*

Bessemer Steel. About the middle of the last century Sir Henry Bessemer, an Englishman, invented the process which bears his name. Its effect on the production of steel was revolutionary, since it reduced the cost of manufacture to a figure so low as to extend the use of steel from the production of such small articles as knives, springs, etc., to that of rails and the framework of bridges and buildings. Bessemer reversed the process described above; instead of adding carbon to wrought iron, he burned it out of cast iron. The smelted iron is either used directly from the blast furnaces or is run into converters, which are vessels shaped somewhat like an eggshell and swung on trunnions, so that they may be tipped to a horizontal position for emptying the liquid. Each converter has a capacity of from ten to twenty tons. The lining is of fire brick, about a foot thick. The bottom is pierced by a number of small holes, through which air is forced from a blast under pressure of from ten to thirty pounds to the square inch. The blast burns out the carbon and silicon. When only the desired proportion of carbon remains, a small quantity of an alloy of carbonized iron and manganese is stirred into the fluid, which is then poured into ladles and run into casting molds. The time consumed in the blowing process is from nine to twelve minutes.

Open-Hearth Steel. This steel takes its name from the fact that the iron is melted in an open-hearth furnace. This furnace resembles the puddling furnace used for wrought iron. The material used was originally a charge of pig iron treated with iron ore; later, pig iron and steel or fragments of wrought iron were melted together. One of the advantages of the open-hearth process is that it provides for the utilization of steel scraps, old rails and fragments of wrought iron.

Most of the steel of commerce is produced either by the Bessemer or by the open-hearth process. Such steel is used for railroad rails, structural material, nails and wire. Steel has taken the place of iron for nearly all structural purposes.

Alloys. There are nearly as many varieties of steel as there are uses for the valuable material, and these varieties are formed by mixing a small quantity of some other metal with the steel when it is in a molten state. The metals most used are nickel, manganese, tungsten, uranium and vanadium, each imparting a peculiar quality to the steel. Vanadium steel, for instance, has a wonderful power to resist shocks, and it is extensively employed in the manufacture of automobiles. Nickel steel is used in the manufacture of armor plate (see WARSHIP). Tungsten steel is valuable in the manufacture of tools.

Tempering. When steel is heated and plunged into cold water, it becomes hard enough to cut glass. But the hardest steel is not suitable for tools, and tool steel is put through a process of tempering. This is accomplished by heating hard steel to a certain temperature and allowing it to cool slowly. The amount of heat determines the temper of the steel. Thus, razor blades are shaped from steel that has been heated to 430° F., whereas sword blades, which require greater elasticity, are produced at a temperature of about 550° F.

Production. Of the three processes described above, the first produces the finest quality of steel, but the production is relatively small because the demand is light. Bessemer steel formerly led in the tonnage produced, but the production of open-hearth steel has steadily gained of late and now takes first place. The United States leads the world in steel production, and in this country the gain of the open-

hearth furnace has been very marked. An idea of the rapid growth of the steel industry in the United States is conveyed by the fact that in the five years prior to 1909 the value of the output increased 46.3 per cent. The production in 1915 amounted to 32,151,036 tons. The annual production of Canada is over 1,000,000 tons. The two leading European steel countries are Germany and Britain. C.H.H.

Consult Campbell's *Manufacture and Properties of Iron and Steel;* Stoughton's *Metallurgy of Iron and Steel.*

Related Subjects. In connection with this article on steel, the reader may consult the following topics in these volumes:

Annealing	Damascus, subhead
Bessemer, Sir Henry	*Damascus Steel*
Iron	Tempering

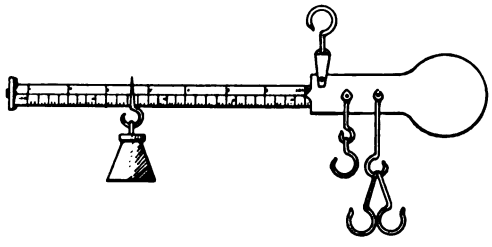
STEELE, *steel,* Sir Richard (1672-1729), a British writer, famous chiefly for his influence upon the early development of the magazine. He was born in Dublin, and educated at the Charterhouse School and at Oxford. After entering the Life Guards in 1694, he wrote a poem in honor of Queen Mary's funeral, and in consequence was given the rank of captain. He had been serving in the army for seven years when he produced *The Christian Hero,* a work intended for his own moral instruction. Soon afterward appeared his comedy, *The Funeral,* succeeded by two others, *The Lying Lover* and *The Tender Husband.*

In 1705 he married a widow, Mrs. Margaret Stretch, who lived for only a year afterward. Following her death Steele was made gazetteer by the government, and shortly afterward married a rich Welsh lady. Later he became commissioner of stamps, justice of the peace in Middlesex, and in 1713 a member of Parliament. Within a year he was expelled from that body because of ideas expressed in an essay on politics, but in 1715 he was again returned. His later life was devoted largely to work on his periodicals. In 1722 he produced a comedy, *The Conscious Lovers,* which was well received and was recognized by the king with a generous gift of money.

Steele stands out in the history of English literature as the originator of the periodicals in which appeared essays on manners and customs, morals, politics and other subjects of public interest. The *Tatler* (1709-1711), issued three times a week, was the first of these publications. Addison, a university friend of Steele's, became a contributor to it as well as to its successor, the famous *Spectator,* for which he wrote 274 essays and Steele 236. *The Guardian,* a third undertaking not long continued, was followed by a series of much less successful periodicals of the same type. The influence for good which the *Spectator* had on the morals and manners of the age was due in large part to Steele.

STEEL'TON, Pa., an industrial borough in Dauphin County, three miles southeast of Harrisburg, on the Susquehanna River and on the Pennsylvania and the Philadelphia & Reading railroads. It is the center of extensive steel enterprises, including bridge and construction works, blast furnaces and rail mills, and has manufactories of cigars and hosiery. It contains a Federal building, churches and schools. In 1910 the population was 14,246; it was 15,548 (Federal estimate) in 1916. The area of the borough is about two square miles.

STEEL'YARD, in mechanics, a device in common use for weighing groceries and other commodities. It consists of an iron bar having one long arm and one short one, and is a lever of the first class (see Lever). The article to be



THE COMMON STEELYARD

weighed is usually hung by a hook, or scale pan, from the end of the short arm; the counterpoise, whose weight is known, is hung on the long arm, which is marked off into notches (see illustration). To obtain the weight of an article the movable weight is shifted on the long arm until there is a balance, and the number at which the weight rests indicates the number of pounds or other unit. The device is usually hung from a fixed support by a ring or hook.

STEEN, *stayn,* Jan (1626-1679), a foremost painter of Holland, ranking next to Rembrandt, among painters of the Dutch school, in range of subjects and ability to portray scenes of everyday life with dramatic effect. Like the English painter Hogarth, he could put a touch of satire into his work, but usually he painted with genial good humor. There was no phase of Dutch life that Steen did not depict; he represented with admirable insight the joys and the sorrows of people in all classes of society. His best canvases are distinguished for their

clear coloring and excellence of composition. That he was an industrious worker is known from the large number of pictures he left—about a thousand, according to one authority. Aside from the facts that he was born at Leiden and studied in Utrecht and Haarlem, little that is authentic is known of his life. Among his notable works are *Eve of Saint Nicholas, The Rustic Wedding* (both at Amsterdam), *The Menagerie* (The Hague) and *The Music Master* (National Gallery, London). The Metropolitan Museum, New York, possesses three examples of his work.

STEFÁNSSON, *sta'fahns sohn,* VILHJÁLMUR (1879-), a Scandinavian explorer who led an expedition which discovered a new land in the Arctic Ocean (1915). This, his third northern trip, was made under the auspices of the American Museum of Natural History and the National Geographic Society, and was financed by the Canadian government. Its object was the exploration of the regions to the west of Parry Archipelago. About six months after sailing from Victoria, British Columbia, in June, 1913, the *Karluk,* largest of the three expedition boats, prepared for three years of scientific work, and carrying expert scientists of several nations, was caught in the ice and sank, with a loss of eleven lives. Stefánsson, with several others of the party, happened to be ashore caribou hunting at the time of the disaster, and was saved.

Undismayed, the explorer resumed the journey by sledge. He and a supporting party left Collinson Point, Alaska, in the spring of 1914, the supporting sledge turning back when seventy-five miles away from shore. Stefánsson pushed on with two men and six dogs, making a three-months' journey across a moving ice pack of the Arctic Ocean. At this time he surveyed large areas of the sea to the north of Alaska and to the west of Banks Land. In February, 1915, he started north by sledge from Cape Kellett, Banks Land, and on this expedition discovered on June 18 an unknown mountainous region near the seventy-eighth parallel, extending from southeast to northwest for one hundred miles. In 1916 he resumed his exploration of the Arctic land areas.

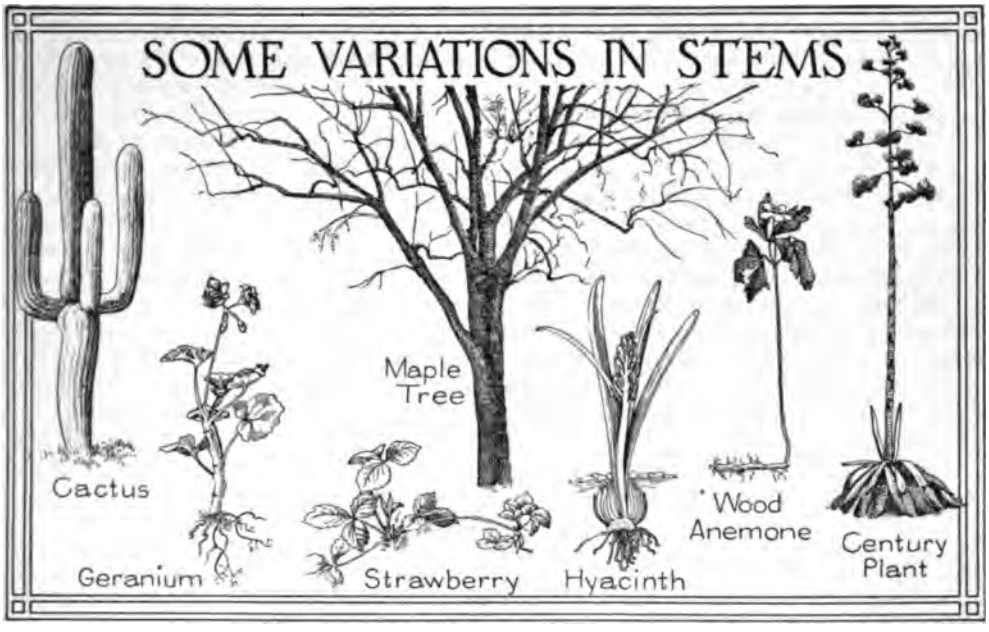
STEIN, *shtyne,* HEINRICH FRIEDRICH KARL, Baron vom (1757-1831), a German statesman who introduced many internal reforms in Germany, was born near Nassau. He attended the University of Göttingen, where he studied jurisprudence, history and politics. Stein visited many of the capitals of Europe, and in June, 1785, was appointed Prussian ambassador to Mainz, Zweibrücken and Darmstadt. But not liking the diplomatic service, he went to England the following year to make a study of political institutions, there gaining knowledge which later assisted him greatly in the conduct of Prussian affairs.

In 1796 he was appointed supreme president of the Westphalian chamber of commerce and mines, and in 1804 became Minister of State for Prussian trade. Stein instituted many reforms, abolished restrictions on internal trade and developed the resources of the country. He was offered the portfolio of Foreign Affairs, but declined it. Being displeased with the existing administration, and very outspoken, he soon offended the conservative Prussians and was dismissed by the king in 1807. Meanwhile, Napoleon completed the ruin of Prussia.

But the Peace of Tilsit (July 7, 1807) made clear the wisdom of Stein's advice, and he was recalled and made virtual dictator of impoverished Prussia. He immediately set about introducing various reforms, abolishing serfdom, installing municipal and military reforms, granting local self-government to all Prussian towns, and opening the way for German unity. A letter criticizing Napoleon's policies having been traced to Stein, that ruler ordered the minister's property confiscated and demanded that the king should dismiss him. Stein resigned in November, 1808, and retired to Austria, where he spent three years. In 1812 he was invited by the Emperor Alexander to Saint Petersburg, and later was requested to act as provisional administrator of East and West Prussia. Stein took part in the drafting of the Russo-Prussian convention in 1813, and after the Battle of Leipzig openly denounced Napoleon.

He was consulted in all the military diplomacy of this unsettled time, but many of his theories were opposed by the narrowness of the German statesmen. The federal system of government promised by Frederick was postponed, and in 1815 Stein, finding himself helpless to mend matters, retired, giving his time to the promotion of art and science in Germany. He died in Kappenberg, Westphalia, June 29, 1831.

STEINBOK, *stine'bahk,* or **STEEN'BOK,** a very small antelope found in the southern part of Africa. Its Dutch name, which means *stone-buck,* was given because it is usually found in rocky places. The steinbok is about twenty-four inches tall, and has a reddish-brown coat that is white underneath. The male has two



forward-curving ringed horns, about four inches long. The European ibex is also frequently called a steinbok.

STELLARTON, *stel'ahr ton,* a town in Pictou County, Nova Scotia, in the north-central part of the Nova Scotia peninsula. It is on the East River and on the Intercolonial Railway, two miles south of New Glasgow and ten miles south of Pictou Landing. By rail to Pictou the distance from Stellarton is thirteen and a half miles. Stellarton is in a prosperous coal-mining district, and is noted for a seam of coal, thirty-seven feet thick, said to be the thickest seam in the world. The town has many large industrial establishments, including a carriage factory, railway repair shops, cigar factory, woodworking factories and bakery. It is a distributing point for farm machinery, vehicles and packed meats. Population in 1911, 3,910; in 1916, about 4,500.

STEM, the stalk of a plant, shrub or tree which supports the leaves in the most advantageous position to receive light and air. It is a coworker with the leaves in changing the raw materials obtained from the soil into plant food. The water and dissolved salts taken in by the roots are carried to the leaves by the stem. There they are converted into plant food by the sunlight and air, and this newly-made food passes through another set of cells in the stem to the parts of the plant where it is needed, or is stored away for future use.

In green-stemmed plants the stalk shares the work of the leaves in converting the raw materials into plant food, but when the green cells are shut away from the light by a thick, corky bark, the stem serves only as a channel for the plant juices and as a support for the leaves and branches. In leafless plants like the cactus, the thick, green stems, which are usually broad and flattened, exposing a large surface to the light and air, perform the functions of the leaves. This fleshy stalk also stores water to supply the plant in times of drought, and has allayed the thirst of many a traveler in the arid plains of Southwestern United States. Some desert plants store a sufficient amount of water in their stems to carry on growth for ten years or more.

The stems of marsh and water plants contain passages and cavities for the storage of air to supply the plant when it is submerged and to buoy up the leaves.

Structure and Growth. If a leafstalk of celery is dipped into an aniline dye and then removed and examined, it will be seen that there are definitely-stained regions, showing that the liquid passed upward into the leaf by certain tissues, or bundles of long, narrow, tubular cells. These are called *fibrovascular bundles,* a term which simply means *collections of threadlike tubes.* Those plants in which the bundles of cells are distributed irregularly throughout the stem, as in the cornstalk, are

the *monocotyledons*. The group in which the cells are arranged in circular form around the pith, as in our common trees, are the *dicotyledons*.

The stems of the latter plants consist of an outer, protective covering of bark and a woody layer containing the bundles of cells surrounding the pith. The cells are of several kinds. A layer of cork cells lies just beneath the bark to prevent loss of water; flexible, tough, fibrous cells give strength to the stem; tubular cells carry the plant food from the leaves; woody cells form the channel through which the water passes to the leaves from the root, and just outside of this woody section are the growing cells, which form new bark on their outer side and new wood on the inner side. The lifetime of a tree is reckoned from the number of rings or layers of new wood formed by these growing cells.

In some plants the stems live but a year, in others two years and in still others, indefinitely. The death of annual stems is not due to the arrival of cold weather, as is often supposed, but to the fact that the cells can develop only a certain amount of new tissue, and when growth stops, the stem dies. Thus the life of the plant is limited to a certain period even in regions where there is no cold winter and not even a single frost.

Stems vary greatly in thickness, ranging in width from the immense trunks of the Big Trees of California to the slender aspen stem which is so delicate that the leaves constantly quiver and softly rustle, giving the tree the name "trembling-leaved poplar." The rate of growth also varies in different plants. The sunflower and giant ragweed stalks grow ten or twelve feet in a season, and slender, climbing stems often grow forty feet in a single summer, while many trees increase in height but one to three inches a year. In the competition to secure light and air, trees in dense forests and plants in thick clumps grow tall and branchless for a great height, but when growing alone they are low and broad-topped.

Underground Stems. The long, slender rootstocks of the May apple, Solomon's seal, mints and several other plants, the short, thick bulbs of the hyacinth and lily and the familiar tuber of the potato are underground stems. They contain large quantities of stored food and supply the plant when new food cannot be made. Some produce an aërial stem and others send up leaves and have no stem above the ground.

Reproduction by Stems. Many plants are reproduced by portions of the stem. Our most obnoxious weeds are those which have underground stems, or rootstocks, which, though cut by the hoe, produce a new plant at every node. The slender, underground runners of the strawberry, the bulbs of the lily and tubers of the potato also produce new plants. The black raspberry forms a new bush by the rooting of an ordinary branch, and many plants, such as the snap willow, geranium, grapevine and currant bush are reproduced from cuttings, or broken-off stems, which take root when planted. The propagation of orchard trees by budding and grafting is of vast importance in the modern cultivation of fruit. See GRAFTING.

Economical Uses of Stems. The food obtained from the stems of plants is of great importance to man and animal. Cane sugar and molasses and maple sugar and syrup are produced by the stems of the sugar cane and maple tree; potatoes and onions are underground stems; rhubarb, asparagus, celery and other vegetables are aërial stems; syrup is derived from cornstalks, which also are an important food of horses and cattle. The fleshy stems of the prickly pear cactus of the thornless variety are another valuable cattle food, and many wild animals, such as the deer, moose and rabbit, browse on the twigs and stems of numerous plants. Common starch is derived from the potato, and sago is made from the starchy pith of the trunk of the palm tree. Perhaps most important of all has been the employment of the wood of trees for building purposes. W.F.R.

STENCIL, *sten'sil,* a thin sheet of metal, cardboard or leather with a pattern cut out by means of interrupted lines or dots. It is used in reproducing letters and designs. The stencil is placed on the surface or material to be ornamented, and a brush or sponge wet with ink or paint is passed over it. Packing boxes are often marked with stencils, and coats and dresses are sometimes ornamented by stenciling. The process is also employed in wall decorations of a high class.

STEPHEN, *ste'ven* (about 1097-1154), a king of England, whose reign, lasting from 1135 to 1154, was one of the darkest in English history. He was the third son of Stephen, Count of Blois, and Adela, daughter of William the Conqueror, and was a nephew of Henry I of England. In return for taking an oath to secure the succession of Matilda, the king's daughter, he was given large estates in Nor-

mandy, as Prince William, the rightful heir, was drowned in the *White Ship* while coming overseas. On the death of King Henry in 1135, Stephen hastened from Normandy to England, laid claim to the throne and was crowned king in Westminster Abbey. After Matilda, with her half-brother, the Earl of Gloucester, landed in England, revolts broke out, Stephen was imprisoned and Matilda acknowledged queen. The war was renewed and lasted for nearly seventeen years, plunging England into misery. Peace was made in 1153, by which Stephen was to retain the kingdom until his death, but was to be succeeded by Matilda's son, Henry of Anjou, first of the Plantagenet line. See HENRY [England].

STEPHENS, ALEXANDER HAMILTON (1812-1883), an American lawyer and statesman and Vice-President of the Confederate States of America. He was born near Crawfordsville, Ga. Stephens entered Franklin College, now the University of Georgia, with the view of becoming a minister, an educational society defraying his expenses. In 1834 he passed a law examination, was admitted to the bar and also taught school to repay his helpers for his education. From 1836 to 1842 he was a member of the state legislature. He was strongly opposed to secession in 1861, but remained loyal to his state when Georgia seceded. Stephens was elected to the Provisional Congress, and was later chosen Vice-President of the new government, but was often at variance with President Davis on questions of states' rights.

ALEXANDER H. STEPHENS
One of the great leaders of the Confederate States of America from 1860 to the end of the War of Secession.

In February, 1865, he headed the unsuccessful peace commission which conferred with President Lincoln at Hampton Roads (see HAMPTON ROADS CONFERENCE). He left Richmond before the war ended, and after the downfall of the Confederacy was arrested and imprisoned for six months at Fort Warren, in Boston harbor. In 1866 he was elected to the United States Senate, but was not permitted to take his seat, so he turned his attention to writing the first volume of his *War Between the States.* Being in reduced circumstances, he taught law classes in 1871, and also served as editor of the Atlanta *Sun,* which was published chiefly to defeat Horace Greeley for the Presidency. He was elected governor of Georgia in 1882 by 60,000 majority, but died before the end of his term.

Consult Trent's *Southern Statesmen of the Old Régime.*

STEPHENSON, *ste'ven son,* the family name of two British engineers, father and son, both of whom made valuable contributions to the development of England's railway system.

George Stephenson (1781-1848), the elder Stephenson, won the name of "founder of railways." He was born at Wylam, near Newcastle. After working on a farm he assisted his father as fireman in a colliery. His interest in original research lead to his invention of a miner's safety lamp and to working out the idea of applying steam power to locomotive engines. His principle was concretely illustrated in a locomotive engine that was set to work in 1814 to operate on a colliery tramway. An improved engine was completed the following year and continues, with Watt's steam engine, to serve as the present-day model in locomotive construction.

GEORGE STEPHENSON
The first "railroad man."

Stephenson was appointed chief engineer of the Stockton & Darlington Railway in 1821, and three years later engineer of the Liverpool & Manchester Railway, which was formally opened in 1830 (see RAILROAD). This railroad purchased his famous, yet crude, locomotive, *The Rocket,* which attained the then amazing speed of twenty-nine miles per hour. Before long his reputation was so great that he was consulted on every large engineering project of his time. The opening of the Liverpool & Manchester Railway was a triumph for him, for it had been attended with many difficulties, and its success marked the real beginning of the British railway system.

Robert Stephenson (1803-1859), the son of George Stephenson, was born at Wallington Quay and died in London. He received an excellent education and on leaving school at-

tended science classes at the University of Edinburgh. He assisted his father in railway surveying and in 1824 went to South America to take charge of mining operations. After a prolonged absence he returned to England to assist his father in the building of the locomotive known as *The Rocket,* which won a prize of £500 ($2,500) offered for the best railway engine. He afterwards became chief engineer on the construction of the first railway to enter London, known then as the London & Birmingham Railway.

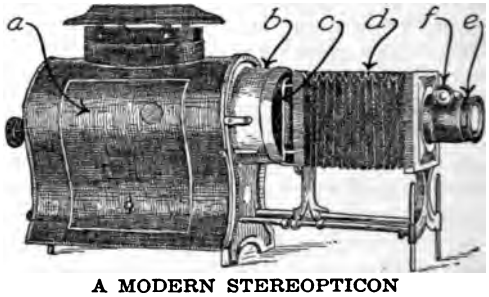
Robert Stephenson is, however, chiefly noted for the engineering genius shown in the great bridges and viaducts constructed by him. He was the inventor of the tubular bridge, of which the two most striking examples are those across the River Conway and the Menai Straits in Wales. He also introduced the use of tubular girders in the construction of iron bridges. The high-level bridge at Newcastle and the Victoria Bridge across the Saint Lawrence River at Montreal rank among the most notable of his engineering achievements.

He began early to show indications of the engineering genius inherited from his father, but his taste led him into the field of construction of railways rather than into the making of railway engines. He visited Germany, Switzerland and many other parts of Europe, also Canada, Egypt and India, for the purpose of building railways in those countries. Taking considerable interest in the political affairs of his country, he was elected a member of Parliament for Whitby, Yorkshire. B.M.W.

Consult Smiles' *Lives of the Engineers.*

STEPPES, *steps,* the Russian name for the extensive, treeless lands extending from Southeastern Europe along the borders of the Caspian Sea to the Altai Mountains in Central Asia. As there is little moisture, farming without irrigation is impossible, although just northwest of this region lies the vast "black earth" plain, the best agricultural section of Russia, where enormous quantities of grain are raised. During the spring, when the rains start the grass growing, great herds of cattle, sheep and horses may be seen grazing, but they are soon led to better pasturage by the wandering tribes of Tartars, for the summer droughts dry up the lands. The great plains of Western North America and the treeless plains, or *pampas,* of Argentina are also steppes.

STEREOPTICON, *ster e op' ti kon,* an apparatus for projecting on a white surface a magnified image of a picture. The principal parts of the apparatus are the lantern, or box for enclosing the light, the condenser, the objective and the light. The lantern box, which is usually made of sheet iron of the best quality, has openings at the top and bottom to provide



A MODERN STEREOPTICON

(*a*) Enclosing lantern
(*b*) Lens and condenser
(*c*) Transparent slide
(*d*) Bellows for lengthening or shortening
(*e*) Combination of lenses
(*f*) Screw to manipulate bellows

thorough ventilation. A door on the side next to the operator gives ready access to the light. The condenser consists of a large, double-convex lens (see LENS), or, more frequently, of two plano-convex lenses with their curved surfaces facing each other. The purpose of the condenser is to gather the rays of light and throw them upon the picture to be projected. The objective consists of two double-convex lenses mounted in a tube of the right length to enable each lens to aid in magnifying the picture. This tube is mounted in a frame with a rack and pinion, enabling the operator so to adjust the focus of the objective to the condenser as to get a sharp definition of the picture on the screen.

The Light. Various devices are used for illuminating stereopticon pictures. That in most general use, and the most satisfactory where large pictures are required, is the electric arc light, in which the carbons are arranged at right angles. This gives a strong, even white light, but its manipulation requires some skill. Single lanterns are on the market which use an incandescent light that can be operated by connecting it with an ordinary electric light attachment. For use in small rooms requiring a picture of medium size these lanterns are very satisfactory. They can also be used with a battery of dry cells and are well adapted to schools and halls in rural communities. Acetylene gas and the oxyhydrogen limelight are also in use, but they have virtually been replaced by the electric light because of its greater convenience.

The Screen. The screen should have a plain white surface perfectly flat and free from wrinkles. Lecture rooms are usually fitted with a white wall for a screen. Heavy muslin hemmed and bound with cord, so that it can be tightly stretched, makes a very satisfactory screen, and screens of this sort are in general use.

The Slides. The pictures generally used in stereopticons are photographs on glass and are known as slides. The American slide is 4x3¼ inches, the English slide 3¼ inches square. They may or may not be colored by hand. Since the perfection of colored photography, beautiful slides are made by that process (see PHOTOGRAPHY, subhead *Color Photography*). Because the lens inverts the picture the slide must be inverted in the lantern to have it appear erect upon the screen.

Dissolving Views. The dissolving view effect is produced by a double lantern with the objectives so adjusted that each covers the same field on the screen, and by an attachment which gradually shuts off the light from one picture as it is turned on the other. In the hands of a skilful operator very pleasing effects are produced. W.F.R.

Consult Gage's *Optic Projection;* Norton's *The Lantern and How to Use It;* Tennant's *Coloring Lantern Slides.*

STEREOSCOPE, *ster'e o skohp,* an instrument through whose lenses photographs are transformed into pictures that are quite lifelike, with an effect of depth and distance and solidity ordinarily possessed only by actual scenes and objects. The first stereoscope was invented in 1838 by Sir Charles Wheatstone in England, but the instrument which came into common use was an improved and simplified model which was developed by Sir David Brewster. Oliver Wendell Holmes, in the United States, brought out still another model, based on the same principle as Brewster's machine but much changed in appearance.

The principle of the stereoscope is comparatively simple. It must be remembered that the eyes of a human being may be compared to cameras; each eye reproduces a separate picture, and the brain combines them into one. Because the eyes are some distance apart, the pictures reproduced are not exactly alike. Each eye sees more of one side of a given object than does the other; together, the two eyes see farther around the sides of an object than can one eye alone. This is what gives objects the effect of standing out from their backgrounds. In a stereoscope the eyes see, through lenses, two separate photographs, exactly alike, but differing to just the degree that the actual scenes would have differed when seen by the eye. These two photographs, which are placed in a rack and arranged so that each eye sees only one, are combined by the brain into one picture, which gives the lifelike effect.

In taking stereoscopic pictures, one camera with two lenses is commonly used, although two separate cameras would, of course, serve the same purpose. Theoretically, the lenses should be placed exactly as far apart as are the human eyes, but in practice it is found more satisfactory to increase the distance, thereby securing an effect of greater depth and distance.

Not many years ago nearly every family possessed a stereoscope, and it occupied with its pictures a prominent place on the parlor table. The popularity of the device has decreased with the advent of moving pictures and of books with halftone illustrations. A.C.

STEREOTYPING, *ster'e o type ing.* A stereotype is a plate made of type metal and used in printing. The process of making such a plate is known as *stereotyping.* The type is set and locked into forms. The face of the type is then brushed over with a brush containing a small quantity of oil. A pulp consisting of a mixture of clay and papier-mâché is then pressed down on the forms so that a perfect impression of the face of each type is made in the pulp. Next, the form is placed in a chamber and baked until the pulp is dry and hard, when it is taken from the type. This mold, or *matrix,* as it is called, is then ready for the stereotype plate, which is made by placing the matrix in a box face up and pouring melted type metal over it. This hardens at once, forming a solid plate of type metal, and from this the page is printed. Plaster of Paris or clay may be used for the matrix, but papier-mâché is in general use.

Plates for use on small presses are flat, but those used on the rotary presses on which daily papers are printed are in the form of a half cylinder (see PRINTING PRESS). Stereotype plates are inexpensive and can be quickly made, the time required being about fifteen minutes. They are specially adapted to newspaper work. A number of plates can be made from the same matrix, and in all large cities there are firms that make a specialty of supplying country newspapers with a part of their subject matter in this way (see NEWSPAPER). The use of the stereotype is now limited to printing

newspapers and the cheapest editions of books. For work of a higher grade the stereotype has been replaced by the electrotype. See ELECTROTYPING.

STERNE, *sturn,* LAURENCE (1713-1768), an English author who had a distinct part in the development of the novel as a form of literature. He was born at Clonmel, Ireland, and as his father was an officer in the army, the boy's early years were spent in traveling from place to place with the regiment. In 1736 he was graduated from Cambridge, and two years later was ordained and given a pastorate in Yorkshire. There he lived for twenty years, performing the duties of a country clergyman and delighting in the works of the old humorists and romancers. With the publication of the first two volumes of *Tristram Shandy* in 1759 his seclusion ended, for at once the book became very popular and the author was much in demand in London society. Seven other volumes of the work appeared within the next eight years, and Sterne's popularity increased. A journey on the Continent in 1765 resulted in *A Sentimental Journey through France and Italy,* which became the book of the moment in England, France and Germany. Sterne lived but a month after its publication.

These two works, his only ones except a volume of sermons and some letters, have the fault of the time in which they were written, which did not demand delicacy in its authors. The sentimentality, too, seems obvious and overdone to a present-day reader; but the merits of the books are no less positive than their faults. Humor pervades the pages, and the easy, rambling style fits excellently the content. More important than all else, Sterne was a real creator of character, and some of the figures from his writings, notably Uncle Toby, from *Tristram Shandy,* will live as long as English is read.

STETHOSCOPE, *steth'o skohp,* a device used by physicians in examining the heart and lungs. Tests are made by listening to the sounds of these organs, as irregularities indicate certain diseases (see HEART, subhead *Sounds of the Heart*). The simplest type of this instrument is a wooden tube about a foot long, hollow through the center and widening out at one end into a bell-shaped flange, which is placed against the chest. The other end is provided with an earpiece. A later device is equipped with two earpieces, joined to the chestpiece by rubber tubes. An instrument on the same order, but much more delicate, is known as a *phonendoscope.* It is a shallow, metal cup having attached to it two rubber ear tubes and a small rod ending in a button, the latter being placed against the chest. When the sounds must be determined with great exactness this instrument is considered preferable to the stethoscope.

STETTIN, *steh teen',* one of the chief centers of German shipbuilding, and the capital of the Prussian province of Pomerania. It is situated on both sides of the Oder, eighty-three miles northeast of Berlin. Stettin is one of the foremost ports of Germany and is an important station on the route to the Baltic and Scandinavia. Because of the rapid development of German shipbuilding and the effort to make the empire a great maritime country, the city is growing rapidly, and it now possesses some of the largest dockyards in the empire.

Stettin carries on a vast trade in wood, corn, petroleum, wine and fish, and is the seat of extensive industries, including the manufacture of clothing, sugar, chemicals and machinery. The clothing industry alone gives employment to more than 10,000 workers. The places of greatest interest are the Municipal Museum, the town hall, the churches of Saint Peter and Saint James, and the old Ducal Palace. The latter is a sixteenth-century structure with modern renovations, and it now contains the law courts and government offices. Population in 1910, 236,113.

STETTLER, *stet'ler,* a town in Central Alberta, the distributing point for a prosperous mixed-farming region. It is served by the Lacombe branch of the Canadian Pacific Railway and by two branches of the Canadian Northern. It lies slightly east of a straight line between Calgary and Edmonton, and is 105 miles south of Edmonton and 154 miles north of Calgary by rail. Camrose is fifty-seven miles north and Red Deer is about forty miles west of Stettler. Population in 1911, 1,444; in 1916, estimated, 2,000.

The important manufacturing establishments of Stettler are a flour mill, with a daily capacity of 100 barrels, and a cigar factory employing about a hundred hands. The storage and shipment of grain and the distribution of farm implements are the important branches of trade. Fishing and shooting in the vicinity are good, and Buffalo Lake, twelve miles north, is a favorite summer resort. Stettler owns and operates its waterworks and electric-lighting plant. The town was founded about 1901, and was named for one of the early settlers.

UBEN, *stu'ben,* FREDERICK WILLIAM RUS, Baron von (1730-1794), a brave Ger- oldier who sailed to America during the itionary War to aid the colonial forces. Steuben offered his services to Congress a veteran European rith a thor- knowledge litary tac- nd Wash- made good him, send- n to Valley e immedi- o drill the colonial and estab-

BARON STEUBEN

efficient military régime. As soon as he e troops in one section trained, he was rred to another section to "collect, or- and discipline" more recruits. After the spent the rest of his life in the United New York, Virginia, Pennsylvania and Jersey gave him grants of land for his s, and Congress voted him a gold-hilted and a pension of $2,400.

UBENVILLE, *stu'ben vil,* OHIO, the seat of Jefferson County, is on the west of the Ohio River near the place where er becomes the eastern state boundary. orty miles west and south of Pittsburgh enty-three miles north of Wheeling, and he Pennsylvania, the Pittsburgh, Cincin- hicago & Saint Louis and the Wheeling e Erie railroads and electric interurban The area exceeds three square miles. opulation, which in 1910 was 22,391, had ed to 27,445 in 1916 (Federal estimate). nent features of the city are the city ourthouse, public library, Gill Hospital rks.

surrounding country is a fertile agricul- section, and the natural wealth of the y includes large deposits of coal, which ensively mined, petroleum, natural gas, nd quarries of fine building stone. Iron eel works, foundries and machine shops, anufactories of pottery, paper, tin plate, nd glassware are the leading industrial Fort Steuben was built in 1787. The vas planned in 1798 and it received a city r in 1851.

VENS, *ste'venz,* THADDEUS (1792-1868), nerican statesman, orator and leader in ess, one of the most aggressive of the antislavery leaders. He was born at Danville, Vt., was graduated at Dartmouth College in 1814, and for a time taught school at York, Pa. Later he studied law and began practice in Gettysburg. He served in the state legislature and in the constitutional convention, and in 1848 and again in 1850 was elected to Congress, where he was a strong opponent of the fugitive slave laws, the Kansas-Nebraska Bill and all other measures favorable to Southern interests. In 1858 he was again elected to Congress, becoming the acknowledged leader of the House and Chairman of the Ways and Means Committee. He was bitterly hostile to the seceding states and was a pronounced advocate of emancipation and the enfranchisement of the negro. In 1868, in a speech in Congress, he proposed the impeachment of President Johnson, and was one of the committee named to prepare the articles of impeachment.

STEVENSON, *ste'venson,* ADLAI EWING (1835-1914), an American statesman, Vice-President of the United States during Cleveland's second administration. He was born in Christian County, Ky., and was educated at Centre College, in the same state. After completing a course in law he was admitted to the bar in 1857 and began practice in Illinois. Having become active in the state Democratic party, he was elected to Congress in 1874. After the election of President Cleveland he was appointed first assistant Postmaster-General, and in 1892 was elected Vice-President of the United States on the ticket with Grover Cleveland. On the expiration of his term Stevenson was appointed a member of the American commission on the adoption of international bimetallism. He was again a nominee for the Vice-Presidency in 1900, on the ticket with William J. Bryan, but failed of election. In 1908 he was the Democratic nominee for governor in Illinois, but was defeated by Deneen. His chief published work was a book of political reminiscences.

STEVENSON, ROBERT (1772-1850), a Scotch engineer who built the famous Bell Rock lighthouse, overcoming what would almost appear insurmountable difficulties, was born at Glasgow.

Being appointed engineer and superintendent of Scottish lighthouses, he earnestly devoted himself to the task of rendering navigation more safe. He erected twenty-three lighthouses on the coasts of Great Britain, and was the inventor of the flash or intermittent light now universally adopted.

Stevenson's father died during his infancy and his mother married Thomas Smith, the chief engineer of the Lighthouse Board. This accounts for the trend of his inclination and abilities which led to his succeeding to his stepfather's position in 1796.

On one of his tours of inspection as chief engineer Stevenson was accompanied by Sir Walter Scott, who describes the famous Bell Rock lighthouse in his diary. In addition to his great work in behalf of safe navigation, Stevenson was widely consulted on construction of roads, bridges, harbors, canals and railways. He died in Edinburgh.

STEVENSON, ROBERT LOUIS BALFOUR (1850-1894), a Scottish essayist, poet and writer of fiction, born in Edinburgh, November 13, 1850, of a well-to-do family. His father was a civil engineer, and the son showed much interest in that profession, which he was not robust enough to adopt. He studied at the University of Edinburgh, though his work was constantly interrupted by ill health, received a training in law, and was admitted to the bar in 1875. However, he turned from law to literature, and in 1878 published *An Inland Voyage,* in which is described a canoeing journey in France and Belgium. Critics recognized at once the charm of the young writer's style, but the public gave the graceful sketch little attention. In the following year he published *Travels with a Donkey,* the material for which had been furnished by a trip through Southern France.

ROBERT LOUIS STEVENSON

His Marriage. In 1876 he had met Mrs. Osbourne, the lady who afterward became his wife, and in 1879 he learned that she was ill in California. Deeply alarmed, he set out at once on the trip across the Atlantic. As travel was expensive and his means were small, he went as a steerage passenger, and crossed the Continent on an immigrant train; and of these experiences he made use in *The Amateur Emigrant* and *Across the Plains.* Arrived in San Francisco he married Mrs. Osbourne, and after some months spent in a desolate mining camp, returned with her and her son Lloyd to Scotland. His health, always far from robust, had suffered severely from the strain of his journey and his anxiety, and the years following his marriage were wandering ones, spent in search of strength.

His Great Work. In spite of the ill health that would have daunted a less courageous man and the unfavorable conditions made unavoidable by his constant traveling, Stevenson produced between 1880 and 1888 two collections of delightful essays, *Virginibus Puerisque* and *Familiar Studies of Men and Books;* a volume of fanciful and entertaining stories, the *New Arabian Nights;* the very popular *Treasure Island; Prince Otto,* a pleasing romance; *Dr. Jekyll and Mr. Hyde; Kidnapped,* an excellent and widely read story of Scotch life, and two collections of poems, *Underwoods* and *A Child's Garden of Verses,* the latter of which reveals a remarkably sympathetic understanding of child life. These little poems seem not merely poems to a child or for a child, but by a child; and they show in delightful fashion what must have been the pleasures of Stevenson's lonely childhood.

Sought Far for Health. In 1888, still in search of health, Stevenson went with his family to Samoa, in the South Seas, where he remained until his death. His home, at the foot of Mount Vaea, he christened Vailima, and his work in superintending the building and improvement of it was a delight to him. He acquired great influence with the natives, and took an active interest in their politics, attending councils, where he sat in state. The most notable of his productions during this later period were *The Master of Ballantrae,* another story of Scotch life; *David Balfour,* a sequel to *Kidnapped,* and the uncompleted romances *St. Ives* and *Weir of Hermiston,* this latter regarded by many critics as Stevenson's greatest work. He died December 3, 1894, of apoplexy, and the next day sixty natives carried his body to the summit of Mount Vaea, where he was buried.

His Place in Literature. Stevenson is one of the most fascinating personalities in the history of English literature, largely because of the courage which helped him to work diligently, uncomplainingly and even cheerfully in the face of great difficulties. Those who knew him personally found it hard to judge fairly of the writer because of the charm which the man exerted. He ranks high, however, by reason of his artistic, delicately wrought style and his

power as a romance writer, second not even to that of Scott. The charm of his first romance, *Treasure Island*, with its unfailing fascination for young and old, is aptly set forth in these lines of Bert Leston Taylor's:

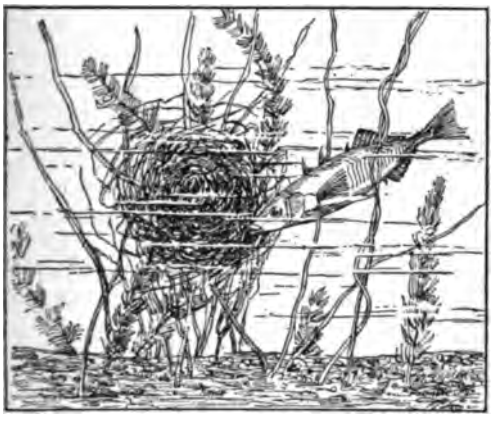
Comes little lady, a book in hand,
A light in her eyes that I understand,
And her cheeks aglow from the faery breeze
That sweeps across the uncharted seas.
She gives me the book, and her word of praise
A ton of critical thought outweighs.
"I've finished it, daddie!"—a sigh thereat.
"Are there any more books in the world like that?"

No, little lady, I grieve to say
That of all the books in the world to-day
There's not another that's quite the same
As this magic book with the magic name.
Volumes there be that are pure delight,
Ancient and yellowed, or new and bright;
But—little and thin, or big and fat—
There are no more books in the world like that.

A.MC C.

Consult Swinnerton's *Robert Louis Stevenson: A Critical Study;* Raleigh's *Stevenson.*

STICKLEBACK, *stik'l bak,* a group of small fishes of the northern hemisphere, so called because certain of the fins are replaced by strong, sharp spines. Instead of having scales the body usually possesses a series of hard plates. There



STICKLEBACK AND ITS NEST

are both fresh-water and ocean species, the former attaining a length of from two to four inches, and the latter, of not more than seven. These fish have the peculiar habit of building muff-shaped nests of sticks and roots for receiving the spawn. The male carefully guards the spawn, and he also watches over the young for several days after the eggs are hatched. Sticklebacks feed upon aquatic insects and worms.

STICK'SEED, a tall, hairy-stemmed weed of the borage family, so named because its fruit, a small, dry nut, has rows of sharp bristles that stick to the clothing of people and to the fur or hair of animals. The plant grows in dry soil quite generally throughout North America, from the Mexican border northwards. It has slender branches, gray-green leaves and small blue, white or lavender flowers. The stickseed is a persistent weed, and can be eradicated only by patient digging and cultivation of the ground.

STIKINE, *stik een',* **RIVER,** a North American stream which has been for many years the chief avenue from the Pacific Ocean into the interior of Northern British Columbia. The Stikine flows into the Pacific Ocean through the narrow strip of Alaska soil which shuts off a large part of British Columbia from the sea. It rises in Canada, on the west slope of the Cassiar Mountains, in British Columbia, and describes an irregular semicircle in its course, running first northward, then westward, and finally curving gradually to the south. The river is 335 miles long, and drains a basin of approximately 20,000 square miles. In summer there is steamer service on the river as far as Telegraph Creek, 170 miles from its mouth.

STILL'WATER, MINN., the county seat of Washington County, is on the Saint Croix River, which forms the southeastern state boundary, eighteen miles northeast of Saint Paul. In the surrounding lake region are a number of pleasure resorts. The city is served by river boats and by the Northern Pacific, the Chicago, Saint Paul, Minneapolis & Omaha and the Chicago, Milwaukee & Saint Paul railroads. In 1910 the population was 10,198. The area of the city is three and one-half square miles. Stillwater has a Federal building, a courthouse, an auditorium, a Carnegie Library and a city hospital, and manufactories of threshers, tractors, clothing, sash, doors, woodwork, boots and shoes and twine. Its lumber interests are important. It is the seat of the Minnesota state prison. The place was settled in 1840 and became a city in 1854. The commission form of government was adopted in 1916.

STILT, a wading bird having long, slender legs which give it the odd appearance of walking on stilts. The birds are found throughout the warmer parts of both hemispheres, but the only North American species is the *black-necked stilt,* which ranges from Oregon southward. It is a handsomely-marked bird about fifteen inches long, with white under parts,

black upper parts and bright red legs. It builds its nest by lining a slight depression in the ground with grasses. The eggs are three or four in number and are of an olive or buffy color, thickly spotted with chocolate tones. The bird frequents shallow ponds in fresh and salt marshes, and feeds on water insects.

STILTS. Every one is familiar with the long walking sticks with foot rests, used by boys in their play, which enable them to cover the ground with very long steps. It is interesting to know that in some sections of Europe, particularly in Belgium and France, the peasants use stilts regularly when the lands are flooded. These practical stilts are strapped securely about the leg below the knee, and the walker uses a long pole to help him maintain his balance.

STING RAY, a group of ray fish whose most striking characteristic is the possession of a long, flexible tail with sharp spines near the base, which have cutting teeth along the edges. With this tail, which is a veritable dagger, painful wounds can be inflicted. The sting ray has a flat, disklike body, and large specimens are sometimes ten or twelve feet long. There are about fifty species; the fish occur most abundantly in tropical seas.

STOCK, Capital. What is known in the business world as *capital* is the money, lands, buildings, equipment, etc., invested in a commercial enterprise. If only two or three people share in such an investment the company is usually a *partnership,* and the evidence of each partner's share in the business is contained in a partnership agreement. If, however, the business is large and the capital is a sum so great that many partners are required, an arrangement so simple is not possible. In such event a *corporation* is formed, and the capital is divided into small sums called *shares.*

Each share may be in face value any sum determined upon—$10, $25, $50, $100, or even more. The usual amount in great enterprises is $100. Since 1916 some states, notably New York, permit corporations to issue stock without assigned value. Each investor, when he puts money into the enterprise, receives a certificate from the company. This states that he is a *stockholder* to the extent of the number of shares named in the certificate; naturally, this paper is called a *certificate of stock,* or a *stock certificate.*

A certificate of stock does not specify what the owner pays for it. One share whose face value is $100 may have cost just that sum; if so, it was bought *at par.* Just to the degree that the corporation is prosperous or is a losing concern the stock sells at prices above or below par. Many people with faith in the future of a somewhat discredited enterprise will buy stock when it is quoted far below par, and will hold it for a long time, confident that changes of fortune will make it a highly valuable investment.

Dividends are sums distributed to stockholders from the profits of the enterprise, and are always based on the par value of the shares. A dividend on stock may be compared to interest on a loan, except that the former is uncertain, while interest is always a fixed sum. If stock pays six per cent in a certain year, the dividend is $6 on each $100 share; if some holders purchased their stock at 50 (one-half par value), the return on their investment is twelve per cent; if they paid 120 (one-fifth above par), the actual income from their stock is five per cent.

Capital stock in most companies is not assessable to meet losses which the business may incur; in others the shareholders may be assessed when the board of directors considers it necessary. An assessment adds to the original cost of the stock to the holder.

Every stockholder is a partner in the business, though he is not so called. As a partner he has the right to vote for those men, also shareholders, who shall give of their time to the oversight of the enterprise. Such managers form the *board of directors.* This board is directly responsible to the investors for the conduct of affairs, and it is given the privilege of choosing the officers in whose hands responsibility of management rests. The officers—president, vice-president, secretary, treasurer, etc.—are responsible to the board. In elections to the board of directors each man's voting power is proportionate to the number of shares he owns. If one man owns fifty-one per cent of the stock he can outvote all other members combined and control elections; this is fair to all, as his investment is largest and he has most at stake. Any stockholder who objects thus to the power of one man need not remain a member of the corporation; he may dispose of his stock as soon as a buyer can be found. E.D.F.

Consult Cook's *Treatise on the Law of Corporations.*

Related Subjects. The reader is referred to the following articles in these volumes:

Commerce	Partnership
Corporation	Stock Exchange

STOCK EXCHANGE, an association of men who buy and sell stocks of railroads and other great industrial enterprises. The name is also applied to the building in which the association conducts its business. The same reasons which justify the existence of a board of trade (which see) may be applied to a stock exchange. When a man wishes to buy or sell shares of a certain stock there should be some convenient place where the transaction may be made. Many years ago, in London, before regular stock exchanges existed, a man desiring to purchase or dispose of stocks went to a well-known coffeehouse (somewhat like a modern restaurant); he knew that brokers, well informed in such business, were in the habit of congregating there, and for a small commission one of them would act as his agent in the transaction. In 1801 these brokers organized a buying and selling association and called themselves, appropriately, a stock exchange.

How Exchanges Became Stable. In the development of such a business many alterations in policy were inevitable. The early exchanges executed commissions in connection with any kind of stock that existed; there was no discrimination between the shares of strong, conservative enterprises and those which were of doubtful value. Finding it to be against public policy to recognize questionable stock and give it official approval equally with that which had proved value, stock exchanges eventually began to limit the number of enterprises whose shares should be recognized. Today a "listed" stock is one which is dealt in on the stock exchanges; so far as the exchanges are concerned any stock they do not list as entitled to their recognition does not exist. Before a company's stock can be listed its officials must satisfy the exchange that it has paid-up capital, that it is a legitimate enterprise and that it is in good financial condition. A balance sheet of the company is carefully scrutinized by the board of control of the exchange; then the stock is listed or the application is rejected.

It will be noted at once that many stocks are quoted on the exchanges every day at prices which mark them as extremely undesirable, if not almost worthless. Such a condition did not exist when they were first admitted to the exchange lists; circumstances which possibly could not have been avoided may have lessened the earning power and thus lowered the price people are willing to pay for shares. Prosperous times or more intelligent management may advance values, or suspicion may force them still lower, but in justice to hundreds of innocent holders of stock the shares remain listed, so their market value may at all times be known.

If a company is able to pay four or five per cent on its capitalization per year its stock sells on the exchanges at about its face value, or *at par*. If its earning power increases until it can pay eight or ten per cent a year people are willing to pay more than face value; purchased even at a premium the investor will get a good income. So great is the earning power of some corporations that their stock is worth from $500 to $900 for every $100 share, but should disaster overtake them and little hope exist that prosperity would return again those same shares might sell for $10 each. In 1916 the Bethlehem Steel Company made excessive profits from the manufacture of war munitions; people were so anxious to purchase its stock that the price advanced for a time to $575 per share. The Standard Oil Company's stock for many years has been quoted at from $600 to $900 per share.

In illustrating the functions of exchanges stocks only have been mentioned. In addition, stock exchanges now deal in the bonds of corporations whose stock they list, although they have not always done so. For many years the New York Stock Exchange limited its activities solely to railroad stocks and bonds.

All great daily papers, in their market reports, print quotations and sales of stocks and bonds. Young people will learn much of value if they consult these lists frequently. They serve somewhat as a business barometer. Soon, with the help of the news columns of the papers, one will be able to know why certain stocks are high and others are low.

Memberships. Because an exchange limits its membership practically to the number of men who can easily care for the business within its sphere of influence, memberships have become worth large sums of money. Their value depends in a large measure upon the prevailing state of business and the market level of securities. The lowest price of a seat on the New York Exchange in a decade was $20,000, in 1896, during a period of national depression; the highest price was $95,000, in 1905 and 1906. A seat on the Boston Exchange does not vary greatly from $16,000; Montreal, $20,000; those of Saint Louis, Chicago, Baltimore, Philadelphia and other market centers, from $1,500 to $5,000.

No man can purchase a membership and thereby become entitled to the privileges of his exchange; he must be formally recommended and then elected. If a member dies his membership becomes the property of his heirs, but such transfer does not carry membership rights. The new owner must be elected to a seat or the membership must be sold and the purchaser must secure election. If on a member's death he is indebted to other members of his exchange the proceeds of the sale of his seat must first be applied to the cancellation of debts; any sum remaining belongs to the beneficiary.

The "Curb." How are unlisted stocks and bonds marketed, and how are their prices known and regulated, if stock exchanges refuse to recognize them? There are scores of companies whose unlisted stocks are on the market, and there is an immense amount of trading in them, in spite of their highly speculative character.

Such purchases and sales are made by what is known as *curb trading,* and the place where they are made is literally *the curb*—the sidewalk and the street, into which traders overflow. If brokers and customers are barred from the stock exchange, they resort to the nearest satisfactory device and gather outside the exchange, or as near to it as possible, on the curb. Here sales and purchases are made very much as they are on the floor of the exchange. Sometimes there is a wildly gesticulating crowd of a thousand men on the curb in New York City. Daily papers in the great cities report these transactions as fully as they do those on the exchanges. The "curb" is a recognized institution in New York, London and Paris. E.D.F.

Consult Van Antwerp's *The Stock Exchange from Within;* Campbell's *The Law of Stock Brokers.*

Related Subjects. The following articles in these volumes should be read in connection with the above:

Board of Trade	Capital
Bucketshop	Corporation

STOCK'HOLM, the capital and metropolis of Sweden and the chief industrial center of that country. It is picturesquely situated on both shores of Lake Mälar at the point where the lake is drained by a small stream into a channel of the Baltic Sea (see map, following page 2092). A part of the city occupies a network of islands and peninsulas, and for this reason it is sometimes called the "Venice of the North." Yet there is nothing else about this interesting capital, with its characteristic northern scenery, its rocky hills and virgin forests, to suggest the tranquil beauty of an Italian city. The old nucleus of Stockholm, called the *Staden,* which is built on an island in the stream, is a place of narrow, winding streets and quaint gabled houses, but the sections on the north and south shores of the mainland have broad, modern avenues, and many handsome squares, promenades, parks and public buildings.

Stockholm is an educational center of importance, though it has no state university. There is an excellent system of elementary schools and there are several higher technical institutions. The Royal Library contains a great collection of books, manuscripts and pamphlets, numbering approximately a million and a half, and there are museums of fine arts, antiquities, ethnology and archaeology, natural history and biology, many scientific and historical academies and an astronomical observatory. Near the observatory are the offices for the distribution of the Nobel Prizes (which see). Stockholm ranks next to Gothenburg in amount of shipping clearing the harbor, and has numerous manufacturing establishments. The manufactures include beer, sugar, cotton goods, tobacco products, furniture, soap, foodstuffs and other commodities. Shipbuilding is an industry of importance. The city was founded by Birger Jarl in 1250. Population in 1910, 342,323; in 1915, estimated to be 386,270.

STOCK'TON, Francis Richard (1834-1902), a popular American writer of humorous stories, called by a contemporary admirer a "wonderful weaver of fancies" and—

> "A King of the Kingdom of Laughter
> And a Prince, but never of Wails."

The stories of Frank Stockton, as he is usually called, are enjoyed for their whimsical humor, unusual characters and situations, and attractive style. Their author spent his early life in his native city of Philadelphia. Although he showed literary ability by writing verses at the age of ten, and by contributions to his high school paper, he became a wood engraver and designer after completing school. He began his professional literary work in 1866, when he became a reporter on the Philadelphia *Morning Post.* Later he joined the staffs of the *Hearth and Home* and *Scribner's Monthly* of New York, and in 1873 became assistant editor of *Saint Nicholas.*

After seven years of editorial work Stockton began to write independently. In 1874 prob-

ably his most popular story, *Rudder Grange,* appeared, and firmly established his fame among American humorists. Among other stories are *The Lady or the Tiger?* his best-known short tale, which has been translated into several other languages; *The Christmas Wreck and Other Stories; The Casting Away of Mrs. Lecks and Mrs. Aleshine,* and its sequel, *The Dusantes; The Beeman of Orn; The Hundredth Man; Pomona's Travels; The Adventures of Captain Horn; Mrs. Clipp's Yacht; Afloat and Ashore; The Girl at Cobhurst,* and *Ting-a-Ling Stories,* a collection of tales for children.

FRANK R. STOCKTON
When he wrote *The Lady or the Tiger?* he created a situation the like of which probably never confronted any other author. He could not bring the story to a close because he was unable to decide whether the lady or the tiger should come through the doorway.

After 1899 he lived at Claymont, in the Shenandoah Valley, near Charlestown, W. Va., an estate formerly owned by the Washingtons and planned by the first President of the United States. He died at Washington, D. C.

STOCK'TON, CAL., the metropolis and county seat of San Joaquin County, located seventy-eight miles east of San Francisco and forty-eight miles southeast of Sacramento. A canal two and one-half miles long extends from the center of the city to the San Joaquin River, furnishing a water route of eighty-five miles to San Francisco. Railroads entering the city are the Atchison, Topeka & Santa Fe, the Southern Pacific, the Western Pacific, the Stockton Terminal & Eastern and the Tidewater Southern. Electric interurban service extends north and south. The population was 23,253 in 1910 and 35,358 in 1916 (Federal estimate). The area exceeds four square miles.

Prominent features of the city include a Federal building erected at a cost of $142,190, Hazleton Public Library, the Western Normal School, Saint Agnes Academy, a state hospital for the insane, a county hospital, Saint Joseph's Home, Dameron Hospital and several bank buildings. Within the city are ten parks, each a block in size, and at the outskirts is a park of twenty-seven acres. Along the canal within the city limits are warehouses, shipyards, lumber yards and flour mills. Steamers sail daily between Stockton and San Francisco, and water commerce is extensive. Stockton is the principal market of this great central valley, a section of grain fields, orchards and vineyards, sheep and cattle farms and dairies. The city has large grain, hay and produce warehouses, and contains important manufactories of harvesters, traction engines, disk harrows and other agricultural machinery, window glass, woolen goods, mining machinery, wheat starch, macaroni, olive oil, wine, leather and canned goods. Each year Stockton sends to market large quantities of general merchandise and agricultural produce, of which the most important items are grain and millstuff, barley, beans and potatoes.

Stockton was settled in 1847 by Capt. C. M. Weber, on a grant of land secured from the Mexican government. Stock raising was at first the only industry, but with the discovery of gold in the Sierra Nevada Mountains the settlement became an important supply station. Boats were used to facilitate trade with San Francisco, and with the agricultural development of the valley Stockton grew as a commercial and manufacturing center. It became a city in 1850 and was named in honor of Robert Field Stockton of the American navy. The commission plan of government was adopted in 1911. N.F.DE E.

STODDARD, *stod'ard,* RICHARD HENRY (1825-1903), an American poet, essayist and critic, born at Hingham, Mass., the son of a sea captain. While he was still a boy the family moved to New York, and he attended the public school there, later studying law. After working for a time in a newspaper office he learned the trade of a blacksmith and then that of an iron molder, at which he worked for several years. In 1849 he produced a volume of poems, *Footprints,* and from that time published frequently either prose or verse. From 1853 to 1870 he had a place in the New York customhouse, and from 1880 until his death was literary editor of the *Mail and Express,* a New York evening paper. His works include *Songs of Summer, The King's Bell, The Book of the East* and *Under the Evening Lamp,* besides biographies, juvenile books and editions of the works of other poets. Stoddard was a true poet, and his imaginative power at times equals that of any other American poet. Delicacy and sincerity are the chief characteristics of his work, and some of his lyric poems

are worthy of wide reading because of their appeal to the highest emotions.

STOICISM, *sto'i siz'm,* belief in the doctrines of Zeno, who was called "the Stoic philosopher," because he gave his lectures in a public porch, called *stoa* in Greek.

Zeno founded his school of philosophy in the latter part of the fourth century B. C. Its teachings were lofty and severe. At a time when the followers of Epicurus were telling the people of Athens that pleasure is the chief end of existence, the Stoics taught *virtue,* for its own sake, as the highest good. They believed in the freedom of the will, in a single divinity, in self-control, courage, temperance and justice, and in repressing all emotion arising from pain or misfortune. One of their doctrines that is embodied in many a modern political creed was that every human being is part of the same "world soul"—a *universal brotherhood* that should dwarf all difference of rank and nationality.

The Stoic philosophy made a strong appeal to the Romans, and Epictetus became the founder of the New Stoic school, to which belonged also such great thinkers as Seneca, Cicero and Marcus Aurelius, "the flower of Stoicism." It has had a marked influence on the thought of the world; it helped to prepare the world for the acceptance of Christianity.

Consult Gomperz' *A History of Ancient Philosophy;* Davidson's *The Stoic Creed.*

Related Subjects. In connection with this discussion of Stoicism, the reader is referred to the following articles in these volumes:

Epictetus	Seneca
Epicurus	Zeno
Philosophy	

STO'LA, the characteristic garment of the Roman matrons, worn over the tunic. It was very full, and was gathered in at the waist by a girdle, falling in soft folds to the ankles or feet. The stola was frequently ornamented at the throat by a Grecian or colored border, and was fastened at the shoulder by a fibula, or ornamental brooch. To complete the Roman costume, the palla, a loose mantle, was draped over the stola in a shawl-like effect. To women who had been divorced from their husbands, the wearing of the stola was forbidden by law. See TUNIC.

STOMACH, *stum'uk,* a muscular, elastic bag, constituting one of the most important organs of digestion. It lies crosswise in the abdominal cavity, beneath the diaphragm and between the liver and the spleen (see illustration, page 7). The stomach, which is really an enlargement of the alimentary canal, is cone-shaped and curves upward at both ends. At the upper left side it opens into the oesophagus, or gullet, and at the right end, which is the narrowest part, it opens into the small intestine (see illustration, page 1796). The opening between the stomach and small intestine is known as the *pyloric orifice.* Under moderate distension the stomach is twelve inches in length and four inches across at the widest part. It then holds about three pints.

STOMACH
Diagrammatic section through coats of stomach, highly magnified.
(*a*) Duct of gastric gland
(*b*) Mucous membrane
(*c*) Muscular coat of mucous membrane
(*d*) Submucous coat
(*e*) Circular muscles
(*f*) Longitudinal muscles

Digestion takes place in this organ through the secretion of *gastric juice.* This is a yellowish fluid consisting of water, salts, mucus, hydrochloric acid and the ferments *pepsin* and *rennin.* Gastric juice is secreted by numerous glands in the mucous membrane which forms the inside lining of the stomach. Next to this lining there is a submucous coat which binds the mucous membrane down to a muscular coat. The latter contains circular longitudinal muscle fibers. These relax and contract and by their movements cause the food to be thoroughly mixed with gastric juice. The outer layer of the stomach is formed of serous membrane.

Abuse of the stomach is the source of many ills to which the human race is subject. For suggestions about proper eating habits, see the articles LIFE EXTENSION and HEALTH HABITS.

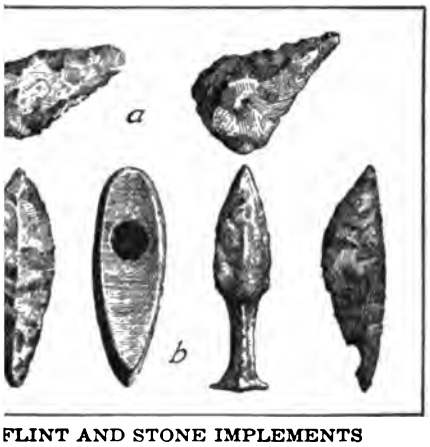
ıted Subjects. The reader is referred to llowing articles in these volumes:

ıen	Intestine
ıtary Canal	Pepsin
ion	

)NE. See Rock.

)NE AGE, a period in the history of a : when they knew nothing of metals, but weapons and instruments made of stone, and horn. There are people in remote s to-day who are still in their Stone Age ıges of the South Seas, Eskimos of the regions—who use only the implements of a long passed by enlightened people. In e men emerged from the Stone Age many ınds of years ago, when animals now ex- roamed the forests—the mammoth, the ' rhinoceros, the cave lion and the cave In Asia and in Africa the Stone Age still earlier. All that is known of these) of other ages is learned from the relics ıre found in caves and river gravel and mounds. There are axes and axham- knives, daggers, spear tips and arrow- saws and chisels, the earliest ones of :d flint, the later ones of polished stone. d bits of bone and horn are found with ınd sometimes very crude pottery. These : cultivated the ground and had domes- imals; those who lived on the seacoast oats and fishing lines.

ntists divide the Stone Age into two)ns—the *Paleolithic* and the *Neolithic*



FLINT AND STONE IMPLEMENTS
ıe were among man's earliest weapons. pecimens of the Paleolithic period; (*b*) of olithic period.

s. The former corresponds roughly to ologic past, and is sometimes called the)f chipped stone." The Neolithic is the of highly finished stone implements.

Stanley Waterloo has written a fascinating book called *The Story of Ab,* in which he describes the life of a boy in the Stone Age. Consult Osborn's *Men of the Stone Age.*

Related Subjects. In this connection the following articles in these volumes provide helpful material:

Age	Human Period
Bronze Age	Iron Age

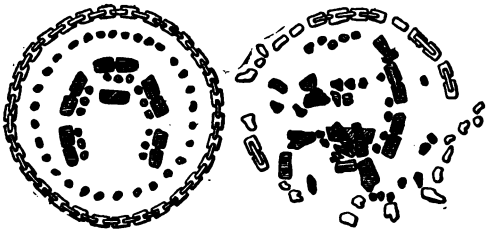
STONECHAT, a small European bird of the warbler family, taking its name from its peculiar note, a sound like that of two pebbles struck together. It is restless and active in habits and is usually found in open, grassy lo-

THE STONECHAT

cations, where it builds its nest on the ground, under a tuft of grass. The eggs are four to six in number, of a greenish-blue color, faintly spotted. The bird migrates in winter to Africa. It feeds on insect larvae, worms, beetles and seeds. The stonechat is the blue titmouse of Ireland.

STONEHENGE, *stone'henj,* an impressive prehistoric monument, now in ruins, consisting of a group of huge, roughhewn stones. Stonehenge is on Salisbury Plain, in Wiltshire, England, a mile and a half from Amesbury. Some of the stones have been carried away to make bridges and milldams, and the structure has also been worn down by time, but scientists, who have found the ruin a subject of absorbing interest, agree that originally it was arranged according to the following plan: The entire monument was surrounded by a circular earthwork, 300 feet in diameter. Within were two concentric circles of standing stones, the

outer circle, which consisted of thirty stones, being 100 feet in diameter. Forty smaller stones made up the inner circle. Within these circles were two other sets of stones, one row within the other and each forming a horseshoe with the opening toward the northeast. Near the central curve of the inner horseshoe, and across a northeast-southwest axis line, was the so-called altar stone, a flat block of blue marble fifteen feet in length. The arrangement of this stone, and of two others placed on a line with it, seem to indicate that they were used to determine the time of the summer solstice. Most authorities think, from this, that Stonehenge was connected with the worship of the sun.



PLAN OF STONEHENGE

At the left, as the stones originally stood; at right, as they now lie, strewn about by the hand of time.

STONEHENGE TO-DAY

One scientist, by calculating the day on which the midsummer sun rose exactly on a line with the axis of the structure, figured that Stonehenge was erected in 1680 B. C. It is supposed that the structure was also used as a temple for consecrating the dead.

STONE MOUNTAIN, a huge, rounded mass of light gray, practically unblemished granite, about an hour's ride by automobile northeast of Atlanta, Ga. It is 800 feet high and 1,500 feet long. This great mound is to be transformed into a permanent memorial of the heroic struggle of the South during the War of Secession, by means of the most colossal piece of sculpturing ever undertaken. It is planned to chisel across its stony face, in bold relief, the figures of about 1,200 men, representing the army of the Confederacy. The figures will be between forty and fifty feet in height, and when the work is completed it will seem to the onlooker that an army of men, some mounted and some on foot, are marching across the face of the mountain. The plans call for lifelike representations of Lee, Stonewall Jackson and many others of the great Southern leaders. It is also planned to have a park surrounding the memorial, with paths and roads so arranged as to afford visitors effective positions from which to view the "army in gray."

THE CONFEDERATE MEMORIAL

Above is a view of Stone Mountain. Beneath is a specimen of the carving. Mounted officers and foot soldiers will be carved in relief almost the entire length of the pile of granite, and will include recognizable images of all the great leaders of the Confederacy, both civil and military.

The financial part of the undertaking is in charge of the Stone Mountain Confederate Memorial Association, at the head of which is the honorary president of the United Daughters of the Confederacy. Funds are being col-

lected for the monument both in the North and in the South. The work will be directed by the American sculptor, Gutzon Borglum; in his biography (page 842) will be found other details of the enterprise.

STO'NER, WINIFRED SACKVILLE, a daughter of Lord Sackville of England, and a distinguished writer and teacher. She is the author of *Natural Education* and other educational books, and the founder of the Natural Education Schools. Mrs. Stoner is perhaps best known as the mother and teacher of Winifred Sackville Stoner, Jr., who as a child was generally believed to be further advanced in her intellectual development than anyone of her age in America. In her *Natural Education,* Mrs. Stoner describes the methods she employed in teaching her daughter. Elsewhere in these volumes (see article EDUCATION, subtitle *Natural Education,* page 1929), Mrs. Stoner presents briefly her educational creed.

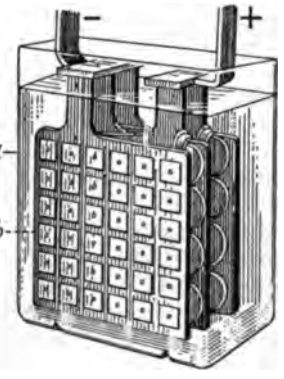
In order to apply her principles and train teachers in her methods, she has founded natural-education schools in New York and one or two other cities. But as the wife of John B. Stoner, a surgeon in the United States Marine Service, she has been obliged to change her place of residence frequently according as Dr. Stoner has been transferred from one hospital to another, so she has not been able to give the continued personal attention to her schools necessary for their complete development. Mrs. Stoner is engaged in many charitable enterprises and political movements affecting the legal status of women in America. She has also devoted much time and energy to the promotion of the Esperanto language. Both her daughter and herself have written textbooks in this language, and have traveled around the world lecturing on behalf of its adoption. M.V.O'S.

STONE'WALL, a town in Manitoba and a residential suburb of Winnipeg, which lies twenty-one miles to the southeast. Stonewall and Winnipeg are connected by an electric line. The town is situated in a prosperous agricultural region in which also there are deposits of building stone, lime and gravel. The chief industrial establishments include grain elevators, lumberyards, a planing mill, stone quarries and limekilns. Stonewall is the seat of a collegiate institute. Population, 1,300.

STONY POINT, a town in Rockland County, New York, noted as the scene of one of the most brilliant exp ic ry War. It is situate at the head of Have m s

north of New York City, and is built on a rocky promontory which the Americans fortified shortly after the struggle with England began. In May, 1779, the fort was captured by the English under Clinton, and a strong garrison was placed there. In July following, General "Mad Anthony" Wayne led an attacking expedition to recover the fort. The Americans advanced in two columns and surprised the British, who immediately opened fire. The Americans did not return the fire, but charged with bayonets so impetuously that the fort, with over 540 prisoners, was taken within thirty minutes. The Americans lost fifteen, the British, sixty-three. The site of the fortifications was acquired by the state in 1897 as a national reservation, and the ruins of the fort may still be seen. The summit contains a lighthouse and fog-bell tower. Population in 1910, 3,651.

STORAGE BATTERY, *stohr'ayj bat'er i.* The storage battery can be understood by anyone who will perform the following simple experiment: Connect four dry cells in series. With two wires connect two strips of lead to the terminals of the battery of dry cells. The lead strips should be at least one inch by four inches. Place the lead strips in a solution composed of one part of strong sulphuric acid to twenty parts of water. Bubbles of hydrogen will rise from one of the lead strips and a red coating will appear on the other. After a few minutes disconnect the dry cells and connect the lead strips to an electric bell. The bell will ring. A storage battery has been formed. The current from the dry cells has produced a chemical change on the lead plates, one of the plates becoming coated with an oxide of lead (lead peroxide), the other remaining pure lead.



A STORAGE BATTERY
(*a*) Case; (*b*) grids.

These two plates, one lead, the other lead peroxide, with the sulphuric acid, form a battery which acts like any other electric battery. The acid acts more rapidly on the oxide of lead than it does on the lead. When the two plates are connected by an electrical conductor this chemical action produces an electric cur-

rent. It is *chemical energy* which is stored in a storage battery. When the proper electrical connections are made this chemical energy is transformed into *electrical energy*. When the battery is run down it is in the same condition as at first; that is, in the simple storage cell described above the lead peroxide has been reduced to lead, so both plates are again lead. The storage battery may be charged and discharged as often as desired.

The difference between a storage battery and other electric batteries is that in all other batteries new solution and new positive plates must be supplied when the battery is run down, while in the storage battery the plates and the solution are renewed by passing an electric current through the battery from some other source.

The plates of commercial storage cells are usually in the form of *grids*. The apertures in the positive plate are filled with lead peroxide and those of the negative plate with porous lead. When the cell is discharged both plates consist of monoxide of lead.

In the Edison storage battery the plates are formed of grids of sheet steel. The grids of the plates which form the positive electrode are filled with nickel hydroxide; the plates forming the negative electrode are filled with an oxide of iron (ferrous oxide) mixed with graphite. The liquid is a solution of caustic potash (potassium hydroxide). The merit of the Edison battery lies in the fact that it will stand without injury severe usage which would destroy a lead battery. It has greater capacity in ampere hours in proportion to weight than a lead battery. The voltage of the Edison battery is about 1.6 volts for each cell, while the voltage of a lead battery is two volts for each cell.

Storage batteries are used for various purposes, but chiefly to furnish power for electric automobiles. These batteries are charged by connecting them with a strong electric current for a few hours. Most garages are equipped to charge storage batteries. E.E.B.

Consult Treadwell's *The Storage Battery;* Watson's *Storage Batteries: Their Theory, Construction and Use.*

Related Subjects. The reader is referred to the following articles in these volumes:

Edison, Thomas A. (page 1926)
Electric Bell
Electricity
Voltmeter

STORK, *stawrk,* a long-legged, strong-winged bird, of large size, finding its food in marshes and swamps, but often nesting on roofs and chimneys, in close proximity to the dwellings of man. It feeds on eels, frogs and toads, reptiles, young birds and small mammals. This bird belongs to the heron family. The best-known species is the *white stork,* found in summer

THE WHITE STORK

throughout most of Europe and Central Asia, and migrating for the winter to Africa and Northern India. This stork has pure white plumage with black wing coverts and quills, a red beak and reddish-pink legs and feet. The pairs return year after year to the same nests, building on to it till it is several feet in height. The eggs are white in color and three to five in number.

Other storks of the eastern hemisphere are the *Japanese stork,* the *black stork,* the *white-necked stork* and the *adjutant.* In South America are found the *maquari stork* and the *jabiru,* a bird five feet high, occurring as far north as Texas. The stork has no voice and can only chatter by striking together the parts of its strong beak.

Much folklore has grown up about the bird, and it is protected and venerated in many sections, especially in Germany and the Netherlands, not only for its usefulness in destroying insects, reptiles, etc., but also as a bird of good omen and the symbol of domestic affection. From its loving care for its young has come the familiar legend that the stork brings the new baby into the home.

STORMS, disturbances of the atmosphere, marked usually by violent winds, rain, snow or hail, or by a combination of two or more of these. If the temperature of the air were everywhere equal, storms would be unknown. But the sun warms the air unevenly; its heat-

ing action is greatest at the equator and is least at the poles. Heated air expands, the upper layers flowing off into the surrounding regions, cooling as they go. This reduces the atmospheric pressure over the warm areas and increases it elsewhere. Air on the lower levels is thus driven into the center of low pressure, and a rotary circulation on a vast scale is maintained, by the action of the sun's heat and the pull of gravitation on the atmospheric envelope.

Storms are known as *general* and *local*. The former alone are described here. Such storms may cover a low pressure area having a diameter of from 500 to 1,000 miles, but they are not often violent. They are accompanied by shifting winds and more or less rain or snow. Technically they are known as *cyclones*, or *cyclonic storms*, but they must not be confused with the so-called cyclones of the Mississippi Valley, which are really tornadoes. Storms which occur in areas of high pressure rather than of low pressure are given the name of *anti-climatic* storms.

Cyclonic storms of this nature have well-defined areas on nearly every continent. In North America they cover the great central region between the Rocky and the Appalachian mountains. They have an almost uniform progress from west to east, and it usually requires eight or ten days for one to make a complete circle. For this reason storms and fair weather succeed each other at frequent intervals. This regularity of movement makes it possible for the Weather Bureau to foretell the approach of these storms from twenty-four to thirty-six hours in advance.

The approach of storms in summer is heralded by an area of low pressure. A light southerly wind prevails. The sky becomes hazy or streaked with clouds. The temperature rises; the air becomes uncomfortably humid; local thunderstorms may occur. Whether rain falls or not, the temperature continues to rise until the center of low pressure passes, when the wind shifts to the west or northwest and a welcome coolness ensues, with a drop of ten or twenty degrees in temperature. The center of the cyclonic area is marked by rain which results from the rapid condensation of vapor in the cooling clouds. Such are the characteristic phenomena of a summer storm in the Mississippi Valley.

Storms are most frequent in the spring and fall months, and are more frequent in winter than in summer. They attain their maximum violence over the sea, where the wind often blows with such velocity as to be a menace to shipping. Their average duration is about three days, but they may continue for as many as ten days.

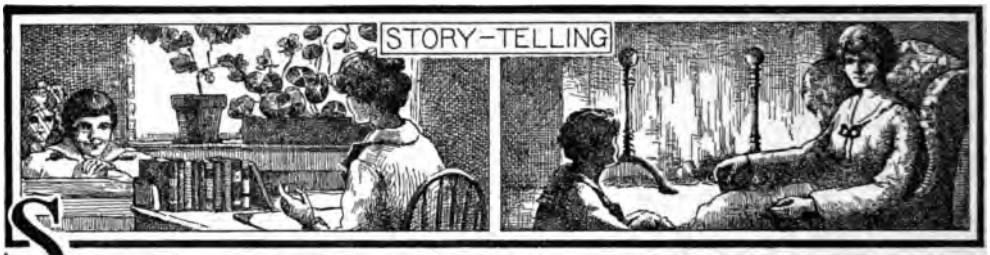
Though few people enjoy stormy weather, storms are a necessity. Without them we would be deprived of rain or snow and of that variation of temperature so essential to the maintenance of health and assurance of good crops on the farms.

Consult Bigelow's *Storms, Storm Tracks and Weather Forecasting* (United States Weather Bureau Bulletin 20); Bowie and Weightman's *Types of Storms of the United States and Their Average Movements.*

Related Subjects. More detailed information as to the causes and character of storms will be found in the following articles:

Blizzard	Rain
Cyclone	Snow
Hail	Tornado
Hurricane	Typhoon
Lightning	Weather Bureau
Monsoon	Whirlwind
Norther	Wind

STORY, *sto'ri,* JOSEPH (1779-1845), an Associate Justice of the United States Supreme Court, whose term was one of the longest in the history of that body. He was born at Marblehead, Mass., graduated at Harvard in 1798, and three years later began the practice of law. Always much interested in literature, he published in 1804 a volume of poems, *The Power of Solitude;* but these were unsuccessful, and he made no future attempt in the field of poetry. His success in his profession was immediate, however, and he became active in politics, serving in the state legislature and in 1808-1809 in the national Congress, where he became known as a leader of the Republican (afterward Democratic) party. President Madison appointed him an Associate Justice of the Supreme Court in 1811, and he served for thirty-four years, exercising an important influence in American constitutional law. The only other Justice except Chief Justice Marshall who served so long was John Maynard Harlan. The most celebrated case on which Justice Story wrote the decision was the Dartmouth College Case. From 1829 until his death Justice Story was professor of law at Harvard, and his reputation as a teacher rivaled that as a jurist. His publications include *Commentaries on the Law of Bailments, Commentaries on the Constitution of the United States, Commentaries on Equity Jurisprudence* and *Conflict of Laws.*



STORY-TELLING. Children have always known that there is nothing in the world more delightful than a good story, well told, but grown people had forgotten the fact for many, many centuries. Time was, in the younger days of the world, when kings and warriors knew no higher pleasure than listening to tales about brave men and beautiful women, but when books became common the story-tellers lost their hold on their audiences, and gradually the art of story-telling was almost lost. Mothers, to be sure, still told tales to their children in the firelight, but the wider phases were almost unknown.

In very recent years, however, there has been a rebirth of the ancient art. Not only do mothers and teachers make constant use of it, but professional story-tellers delight men and women as well as children with this new-old form of entertainment.

The Purposes of Story-Telling. The child, with his incessant demand for stories and "just one more" story, has but one idea in mind—to be amused and entertained. The mother or teacher who makes use of stories for other purposes must therefore bear one fact in mind: unless the story is interesting the child will not listen; and if he does not listen, the other purposes are defeated at the outset. The first, great purpose of story-telling, then, must be to entertain. Nor need this be looked upon as an unworthy aim. The picture, the statue, the poem exist to give joy, and the story is but another means for appealing to the love for the beautiful.

But story-telling may and does accomplish other things. It may be made, without developing an unpleasantly aggressive moral character, to teach lessons of thoughtfulness, of patriotism and of faith. In fact, the story furnishes so surely the easiest and most direct road to the child's heart and conscience that one wonders how the mother who cannot or will not tell her children stories ever teaches them any moral lessons.

Then, too, story-telling develops the imagination. There is little danger that, as some parents fear, the child's imagination will be overdeveloped by the use of fairy tales or myths; the danger is far greater that, without these aids, the imagination will be totally undeveloped, and the person will live always in the valleys and never on the mountain tops where imagination gives him the right and the ability to live.

From the teacher's point of view it is of the utmost importance that a love for nature, for history, for many of the works of the great authors may be awakened by means of stories. This does not mean that the pupils should be given their nature study, their history or their literature all in the form of stories; these should be merely the introduction, the appetizer which stimulates a desire for the more solid things.

Other purposes may be mentioned hastily. Powers of concentration are strengthened by listening to stories; the vocabulary is increased and the foundations of an easy, grammatical English style are laid unconsciously. A child's comprehension and sympathies are broadened, too, and he is brought into contact with lives spent amid entirely different surroundings from his own.

How to Choose a Story. Of course the purpose for which a story is told influences to a certain extent the choice; but there are certain qualities which every story must possess if it is to fulfil any purpose. Older people may listen, through courtesy, to things in which they are not interested, but the child has no conscience on this matter—he listens only to what is so interesting that it holds his attention in spite of himself.

First of all, the story must have action, from beginning to end, and all the action must point to one definite conclusion. Explanations, long descriptions, "preaching" have no place in a story. Frequently a practiced story-teller can see in some tale overburdened with these undesirable elements a basis of action which is just what she wants, and can prune away all that retards this action. This one principle cannot be too strongly emphasized—the action need

not be particularly exciting, but there must be something happening all the time.

Much depends, too, on the beginning of the story. It must be direct and simple, and must locate the story at once in the child's mind. This does not mean that a definite situation is necessary—the familiar "once upon a time" or "in a wonderful far-off country" answers all requirements, but the hearer must not be left to "flounder." Introductory matter, unless of the very briefest, should be omitted. Unless the child's attention is held from the very first word, it is difficult to gain later.

No less important is the ending. Stories for grown-ups may present a "section of life," with no solution of the problems raised, no definite rounding-out of the lives of the characters, but children will tolerate no such halfway measures. Everything must be settled, once and for all, before the curtain falls. And the child is perfectly correct, from his own point of view, in demanding a happy ending. He has an innate feeling of justice which tells him that good people should be rewarded and bad people punished, and unless the story works out in that way, there is something wrong with the story. He knows nothing of the complicated ethics of later years, which finds it difficult to separate right from wrong.

One other point is worth remembering. The story must have "points of contact" with the children's experiences; that is, it must present images of familiar objects, though these may be placed amid unfamiliar surroundings or tinged with mystery. The children, for instance, have never seen a princess; but as the story proceeds it is evident after all that a princess is only a little girl who has to mind her father and mother, just as they have to mind their father and mother. There is enough difference to lend interest, but enough similarity to make comprehension possible.

It is found by story-tellers everywhere that children have a particular fondness for repetition of phrases or sentences within the stories. In the nonsense tale of *Epaminondas and His Auntie,* for instance, Mother's "Epaminondas, you ain't got the sense you was born with" never fails to evoke a delighted grin at every repetition. There seems to be a charm in coming across, in the midst of the newness, a phrase or sentence that has been heard before. Of course repetition is not really necessary to a successful story, but it is highly desirable.

The story-teller should remember, too, that the vocabulary of the children and their ability to use English are certain to be influenced by the stories to which they listen so absorbedly, and she should choose only such as have a pleasing English style. They need not, in fact should not, be in formal, bookish English, but they should make use of no expressions which the child may not safely adopt.

How to Tell a Story. The story may be told for the most excellent of purposes, and it may possess all the characteristics of the perfect tale, but if it is not well told it cannot fulfil its whole aim. This should not discourage anyone from attempting to tell stories, however, for while every one cannot be a natural story-teller with the real "gift," every one may learn to tell a story acceptably. Very much, of course, depends on the personality, but there are certain rules which, if followed, are certain to bring success. The actual telling is the dynamic, the creative, part of the story-teller's art—the part which can give her real joy, whether she have an audience of one or of one hundred.

Know the Story Thoroughly. This might seem an unnecessary warning, but the spectacle is painfully familiar of the story-teller who knows her material only fairly well and who finds it necessary to repeat, to go back and pick up dropped threads, to make explanations of points that should have been perfectly clear. The story should be so familiar that the teller does not have to think ahead, but can have her mind on each point as she brings it out.

This does not mean that the story should be memorized; indeed, the memorized tale is almost certain to sound more like a recitation than like a genuine "told" story. Nor does it mean that the same words must always be used. Probably there will be changes every time the story is told, but if there are any of those repetitions in which children delight, or conversations or specially favored passages, they should not be changed.

Feel the Story. If the story-teller, after careful study, feels that a certain story is dull or silly, she should not attempt to tell it, no matter how successfully others may have done so. In some way or other the teller's feeling in regard to the story communicates itself to the hearers, and they will not enjoy to the full a story which the teller is not enjoying.

Be Natural. Many people make a mistake in dealing with children by "talking down" to them or babying them. Children like to feel that the things that interest them are important enough to be dealt with in a grown-up

manner, and they resent passively, if not actively, the honeyed voice and the "Now my dear little children" attitude.

Be Graphic. The story-teller should have vividly before her mind the pictures in the story, and should present these as clearly and directly as possible. Too much thought of the words in which the story is being told works against this graphicness.

Watch the Audience. Anyone who watches her audience, particularly if that audience be composed of children, can tell instantly whether or not she is pressing her points home. If the eyes cling to hers and every expression of her face is mirrored unconsciously in theirs, she has no need to fear—she is in a fair way to become a successful story-teller and is going to enjoy her experiences.

Will to Succeed. There exists between the teller of the story and the listeners an unexplainable subtle connection which seems almost hypnotic. If the teller thoroughly enjoys a story herself and wills with all her might that her hearers shall enjoy it, she is likely to see a responsive, satisfied look appearing in the faces of the listeners. A.MCC.

Stories to Tell

The following stories have all been found to appeal to children. They cover a wide range—the fable, the nature story, the supernatural tale—but they all possess that something which children love. The arrangement is by seasons—four for spring telling, three for summer, four for autumn and three for winter. At the close is given a supplementary list of stories, similarly grouped.

SPRING STORIES

The Wind and the Sun

One spring day a dispute arose between the Wind and the Sun as to which was the stronger. As they were quarreling they saw a traveler walking along the road, with a great cloak thrown about his shoulders.

"Now we may make trial of our strength," declared the Wind; "let us both try with all our might, and the one who can compel the traveler to take off his coat shall be acknowledged the more powerful."

"Agreed," said the Sun. "Let the contest begin."

The Wind began by sending a furious blast that nearly snatched the coat away, but the shivering traveler clutched it the more tightly and drew it about him. The Wind puffed and tugged, and even brought a storm of rain and hail to help him, but the more it stormed, the more closely did the traveler wrap his cloak around him. Finally the Wind admitted that he could not get it away, and sank down, defeated.

Then the Sun took his turn. He drove away the clouds the Wind had scattered and shone with all his brightest beams on the man's shoulders. Hotter and hotter it grew until the traveler was really uncomfortable. He unfastened his coat, and then, as the sun never stopped shining, he threw it back, and finally took it off and ran hastily into the shade. The Sun had won by gentleness what the Wind could not win by force.

The Ugly Duckling

It was glorious in the country; it was summer; the cornfields were yellow, the oats were green, the hay had been put up in stacks in the green meadows, and the Stork went about on his long, red legs, and chattered Egyptian, for this was the language he had learned from his mother. All around the fields and meadows were great woods, and in the midst of these woods, deep lakes. Yes, it was right glorious in the country.

In the midst of the sunshine there lay an old farm, with deep canals about it; and from the wall down to the water grew great burdocks, so high that little children could stand upright under the tallest of them. It was just as wild there as in the deepest wood, and here sat a Duck upon her nest; she had to hatch her Ducklings; but she was almost tired out before the little ones came, and she seldom had visitors. The other ducks liked better to swim about in the canals than to run up to sit under a burdock and gabble with her.

At last one eggshell after another burst open. "Pip! pip!" each cried, and in all the eggs there were little things that stuck out their heads.

"Quack! quack!" said the Duck, and they all came quacking out as fast as they could, looking all around them under the green leaves; and the mother let them look as much as they liked, for green is good for the eye.

"How wide the world is!" said all the young ones; for they certainly had much more room now than when they were inside the eggs.

"D'ye think this is all the world?" said the mother. "That stretches far across the other side of the garden, quite into the parson's field; but I have never been there yet. I hope you are all together," and she stood up. "No, I have not all. The largest egg still lies there. How long is that to last? I am really tired of it." And so she sat down again.

"Well, how goes it?" asked an old Duck who had come to pay her a visit.

"It takes a long time for this one egg," said the Duck who sat there. "It will not open. Now, only look at the others! They are the prettiest little Ducks I ever saw. They are all like their father; the rogue, he never comes to see me."

"Let me see the egg which will not burst," said the old Duck. "You may be sure it is a turkey's egg. I was once cheated in that way, and had much care and trouble with the young ones, for they are afraid of the water. Must I say it to you? I could not make them go in. I quacked, and I clacked, but it was no use. Let

me see the egg. Yes, that's a turkey's egg. Let it lie there, and do you teach the other children to swim."

"I think I will sit on it a little longer," said the Duck. "I've sat so long now that I can sit a few days more."

"Just as you please," said the old Duck; and she went away.

At last the great egg burst. "Pip! pip!" said the little one, and crept forth. He was so big and ugly. The Duck looked at him.

"It's a very large Duckling," said she. "None of the others looks like that; it really must be a turkey chick! Well, we shall soon find out. Into the water shall he go even if I have to push him in."

The next day it was bright, beautiful weather; the sun shone on all the green burdocks. The Mother Duck with all her family went down to the canal. Splash! she jumped into the water. "Quack! quack!" she said, and one duckling after another plumped in. The water closed over their heads, but they came up in an instant, and swam off finely; their legs went of themselves, and they were all in the water; even the ugly gray Duckling swam with them.

"No, it's not a turkey," said she; "look how well he uses his legs, how straight he holds himself. It is my own child! On the whole, he's quite pretty, when one looks at him rightly. Quack! quack! come now with me, and I'll lead you out into the world, and present you in the duck yard; but keep close to me all the time, so that no one may tread on you, and look out for the cats."

And so they came into the duck yard. There was a terrible row going on in there, for two families were fighting about an eel's head, and so the cat got it.

"See, that's the way it goes in the world!" said the Mother Duck, and she whetted her beak, for she too wanted the eel's head. "Only use your legs," she said. "See that you can bustle about, and bend your necks before the old Duck yonder. She's the grandest of all here; she's of Spanish blood—that's why she's so fat; and do you see? she has a red rag around her leg; that's something very, very fine, and the greatest mark of honor a Duck can have; it means that one does not want to lose her, and that she's known by the animals and by men, too. Hurry! hurry!—don't turn in your toes; a well-brought-up Duck turns its toes quite out, just like father and mother—so! Now bend your necks and say 'Quack!'"

And they did so; but the other Ducks round about looked at them, and said quite boldly:

"Look there! now we're to have this crowd, too! as if there were not enough of us already! And—fie!—how that Duckling yonder looks; we won't stand that!" And at once one Duck flew at him and bit him in the neck.

"Let him alone," said the mother; "he is not doing anything to anyone."

"Yes, but he's too large and odd," said the Duck who had bitten him, "and so he must be put down."

"Those are pretty children the mother has," said the old Duck with the rag round her leg. "They're all pretty but that one; that is rather unlucky. I wish she could have that one over again."

"That cannot be done, my lady," said the Mother Duck. "He is not pretty, but he has a really good temper, and swims as well as any of the others; yes, I may even say it, a little better. I think he will grow up pretty; perhaps

"IF THE CAT WOULD ONLY CATCH YOU!"

in time he will grow a little smaller; he lay too long in the egg, and therefore he has not quite the right shape." And she pinched him in the neck, and smoothed his feathers. "Besides, he is a drake," she said, "and so it does not matter much. I think he will be very strong: he makes his way already."

"The other ducklings are graceful enough," said the old Duck. "Make yourself at home; and if you find an eel's head, you may bring it to me."

And now they were at home. But the poor Duckling who had crept last out of the egg, and looked so ugly, was bitten and pushed and made fun of, as much by the ducks as by the chickens.

"He is too big!" they all said. And the turkey cock, who had been born with spurs, and so thought he was an emperor, blew himself up, like a ship in full sail, and bore straight down upon him; then he gobbled and grew quite red in the face. The poor Duckling did not know where he dared stand or walk; he was quite unhappy because he looked ugly, and was the sport of the whole duck yard.

So it went on the first day; and then it grew worse and worse. The poor Duckling was hunted about by every one; even his brothers and sisters were quite angry with him, and said, "If the cat would only catch you, you ugly creature!" And the ducks bit him, and the chickens beat him, and

the girl who had to feed the poultry kicked at him with her foot.

Then he ran and flew over the fence, and the little birds in the bushes flew up in fear.

"That is because I am so ugly!" thought the Duckling; and he shut his eyes, but flew on farther; and so he came out into the great moor, where the Wild Ducks lived. Here he lay the whole night long, he was so tired and sad.

Toward morning the Wild Ducks flew up, and looked at their new mate.

"What sort of a one are you?" they asked; and the Duckling turned about to each, and bowed as well as he could. "You are really very ugly!" said the Wild Ducks. "But that is all the same to us, so long as you do not marry into our family."

Poor thing! he certainly did not think of marrying, and only dared ask leave to lie among the reeds and drink some of the swamp water.

There he lay two whole days; then came thither two Wild Geese, or more truly, two Wild Ganders. It was not long since each had crept out of an egg, and that's why they were so saucy.

"Listen, comrade," said one of them. "You're so ugly that I like you. Will you go with us, and become a bird of passage? Near here is another moor, where there are a few sweet, lovely Wild Geese, all unmarried, and all able to say 'Quack!' You've a chance of making your fortune, ugly as you are."

"Piff! paff!" sounded through the air; and both the Ganders fell down dead in the reeds, and the water became blood red. "Piff! paff!" it sounded again, and the whole flock of Wild Geese flew up from the reeds. And then there was another report. A great hunt was going on. The gunners lay around in the moor, and some were even sitting up in the branches of the trees, which spread far over the reeds. The blue smoke rose like clouds in among the dark trees, and hung over the water; and the hunting dogs came —splash, splash!—into the mud, and the rushes and reeds bent down on every side. That was a fright for the poor Duckling. He turned his head to put it under his wing; and at that very moment a frightful great dog stood close by the Duckling. His tongue hung far out of his mouth, and his eyes glared horribly. He put his nose close to the Duckling, showed his sharp teeth, and—splash, splash!—on he went without seizing it.

"Oh, Heaven be thanked!" sighed the Duckling. "I am so ugly that even the dog does not like to bite me!"

And so he lay quite quiet, while the shots rattled through the reeds and gun after gun was fired. At last, late in the day, all was still; but the poor little thing did not dare to rise up; he waited several hours still before he looked around, and then hurried away out of the moor as fast as he could. He ran on over field and meadow; there was a storm, so that he had hard work to get away.

Towards evening the Duckling came to a peasant's poor little hut; it was so tumbled down that it did not itself know on which side it should fall; and that's why it stood up. The storm whistled around the Duckling in such a way that he had to sit down to keep from blowing away; and the wind blew worse and worse. Then he noticed that one of the hinges of the door had given way, and the door hung so slanting that he could slip through the crack into the room; and that is what he did.

Here lived an old woman, with her Cat and her Hen. And the Cat, whom she called Sonnie, could arch his back and purr; he could even give out sparks; but for that, one had to stroke his fur the wrong way. The Hen had quite small, short legs, and therefore she was called Chicka-biddy Shortshanks; she laid good eggs, and the woman loved her as her own child.

In the morning they noticed at once the strange Duckling, and the Cat began to purr and the Hen to cluck.

"What's this?" said the woman, and looked all around; but she could not see well, therefore she thought the Duckling was a fat duck that had strayed. "This is a rare prize!" she said. "Now I shall have duck's eggs. I hope it is not a drake. We must try that."

And so the Duckling was taken on trial for three weeks, but no eggs came. And the Cat was master of the house, and the Hen was the lady, and always said "We and the world!" for they thought they were half the world, and by far the better half. It seemed to the Duckling that one might have another mind, but the Hen would not allow it.

"Can you lay eggs?"

"No."

"Then will you hold your tongue!"

And the Cat said, "Can you curve your back, and purr, and give out sparks?"

"No."

"Then you will please have no opinion of your own when sensible folks are speaking!"

And the Duckling sat in a corner and was in low spirits; then he began to think of the fresh air and the sunshine; and he was seized with such a strange longing to swim on the water that he could not help telling the Hen of it.

"What are you thinking of?" cried the Hen. "You have nothing to do, that's why you have these fancies. Lay eggs, or purr, and they will pass over."

"But it is so charming to swim in the water," said the Duckling, "so nice to feel it go over one's head, and to dive down to the bottom!"

"Yes, that's a fine thing, truly," said the Hen. "You are clean gone crazy. Ask the Cat about it—he's the cleverest thing I know—ask him if he likes to swim in the water, or to dive down: I won't speak about myself. Ask our mistress herself, the old woman; no one in the world knows more than she. Do you think she wants to swim, and to let the water close above her head?"

"You don't understand me," said the Duckling.

"We don't understand you! Then pray who is to understand you? You surely don't pretend to be cleverer than the Cat and the woman—I won't say anything of myself. Don't make a fool of yourself, child, and thank your Maker for all the good you have. Are you not come into a warm room, and have you not folks about you from whom you can learn something? But you are a goose, and it is not pleasant to have you about. You may believe me, I speak for your good. I

tell you things you won't like, and by that one may always know one's true friends! Only take care that you learn to lay eggs, or to purr and to give out sparks!"

"I think I will go out into the wide world," said the Duckling.

"Yes, do go," replied the Hen.

And so the Duckling went away. He swam on the water, and dived, but he was shunned by every creature because he was so ugly.

Now came the fall of the year. The leaves in the wood turned yellow and brown; the wind caught them so that they danced about, and up in the air it was very cold. The clouds hung low, heavy with hail and snowflakes, and on the fence stood the raven, crying, "Croak! croak!" for mere cold; yes, one could freeze fast if one thought about it.

One evening—the sun was just going down in fine style—there came a whole flock of great, handsome birds out of the bushes; they were shining white, with long, supple necks; they were swans. They uttered a very strange cry, spread forth their glorious great wings, and flew away from that cold region to warmer lands, to fair open lakes. They mounted so high, so high! and the ugly Duckling had such a strange feeling as he saw them! He turned round and round in the water like a wheel, stretched out his neck towards them, and uttered a cry, so high, so strange, that he feared as he heard it. Oh! he could not forget those beautiful, happy birds; and as soon as he could see them no longer, he dived down to the very bottom, and when he came up again, he was quite beside himself. He did not know what the birds were, nor where they were flying to; but he loved them more than he had ever loved anyone. He did not envy them at all. How could he think of wishing to have such loveliness as they had? He would have been glad if only the ducks would have let him be among them—the poor, ugly creature!

And the winter grew so cold, so cold! The Duckling had to swim about in the water, to keep it from freezing over; but every night the hole in which he swam about became smaller and smaller. It froze so hard that the icy cover sounded; and the Duckling had to use his legs all the time to keep the hole from freezing tight. At last he became worn out, and lay quite still, and thus froze fast in the ice.

Early in the morning a peasant came by, and found him there; he took his wooden shoe, broke the ice to pieces, and carried the Duckling home to his wife. Then the Duckling came to himself again. The children wanted to play with him; but he thought they wanted to hurt him, and in his terror he flew up into the milk pan, so that the milk spilled over into the room. The woman screamed and shook her hand in the air, at which the Duckling flew down into the tub where they kept the butter, and then into the meal barrel and out again. How he looked then! The woman screamed, and struck at him with the fire tongs; the children tumbled over one another as they tried to catch the Duckling; and they laughed and they screamed!—well was it that the door stood open, and the poor creature was able to slip out between the bushes into the newly-fallen snow. There he lay quite worn out.

But it would be too sad if I were to tell all the misery and care which the Duckling had to bear in the hard winter. He lay out on the moor among the reeds when the sun began to shine again and the larks to sing; it was a beautiful spring.

Then all at once the Duckling could flap his wings: they beat the air more strongly than before, and bore him stoutly away; and before he well knew it, he found himself in a great garden, where the elder trees stood in flower, and bent their long, green branches down to the winding canal, and the lilacs smelt sweet. Oh, here it was beautiful, fresh, and springlike! and from the thicket came three glorious white swans; they rustled their wings, and sat lightly on the water. The Duckling knew the splendid creatures, and felt a strange sadness, such as he had never known before.

"I will fly away to them, to the royal birds! and they will beat me, because I, that am so ugly, dare to come near them. But it is all the same. Better to be killed by them than to be chased by ducks, and beaten by fowls, and pushed about by the girl who takes care of the poultry yard, and to suffer hunger in winter!" And he flew out into the water, and swam toward

NO LONGER UGLY AND HATEFUL TO LOOK UPON

the beautiful swans; these looked at him, and came sailing down upon him with outspread wings. "Kill me!" said the poor creature, and bent his head down upon the water, and waited for death. But what saw he in the clear water? He saw below him his own image; and, lo! it was no longer a clumsy, dark-gray bird, ugly and hateful to look at, but—a swan!

It matters nothing if one is born in a duck yard if one has only lain in a swan's egg.

He felt quite glad at all the need and hard times he had borne; now he could joy in his good luck, in all the brightness that was round him. And the great swans swam round him and stroked him with their beaks.

Into the garden came little children, who threw bread and corn into the water; and the youngest cried "There is a new one!" and the other children shouted, "Yes, a new one has come!" And they clapped their hands and danced about, and ran to their father and mother; and bread and cake were thrown into the water; and they all said, "The new one is the most beautiful of all! so young and so handsome!" and the old swans bowed their heads before him.

Then he felt quite ashamed and hid his head under his wings, for he did not know what to do; he was so happy, and yet not at all proud, for a good heart is never proud. He thought how he had been driven about and mocked and despised; and now he heard them all saying that he was the most beautiful of all beautiful birds. And the lilacs bent their branches straight down into the water before him, and the sun shone warm and mild. Then his wings rustled, he lifted his slender neck and cried from the depths of his heart:

"I never dreamed of so much happiness when I was the Ugly Duckling."

The Three Butterflies

One morning there were three gay little butterflies, a red, a yellow and a white, playing in the garden in the sunshine. They danced happily from flower to flower and never grew tired at all. Presently a cloud slipped in front of the sun, and the garden grew gloomy, but still the red butterfly and the yellow butterfly and the white butterfly danced above the flowers. But when the rain began to fall and to wet their pretty, gauzy wings, they flew home. Alas! the door of their house was locked and they could not find the key.

Back to the garden they flew, and up to a tall, white lily. "Beautiful lily," they said, "let us creep into your flower so that the rain cannot hurt us." "I will take the white butterfly in," said the lily, "because she looks like me; the other ones I do not like." Then the white butterfly said, "If you will not shelter my sisters, I will not come in either." And the three butterflies flew away in the rain, dancing no longer, but looking very sad and sorry.

It rained harder and harder, and the three flew to a gay red and yellow tulip. "Open your blossom, tulip," they cried, "and let us slip in out of the rain." The tulip was haughty. "I will open for the red and yellow," it replied, "for they wear my colors; the white one I do not like." Then the red and yellow butterflies said, "If our sister may not come in, neither will we; it is better for us to get wet together than to desert one another," and they flew away.

Now the sun, back of his cloud curtain, had heard all that the butterflies said, and was pleased because they were so unselfish and loved one another. So he pushed his way through the clouds, drove away the rain, and made the garden sweet and bright again. The butterflies soon dried their wings in the sunshine, and danced happily above the flowers until night.

Tikki-Tikki-Rimbo

A NONSENSE TALE FOR APRIL FOOL'S DAY

A farmer and his wife had two little children, and they were twins. The little girl was so bright and happy that they named her Joy, but the boy was a sulky, sullen fellow, and they named him Tikki-tikki-rimbo-rimbo-rimbo, tikki-tikki-rimbo-rimbo-rimbo, allamentapantico bonasco Schutz.

One day the children were playing out in the yard and Joy fell into the well. Tikki-Tikki-rimbo-rimbo-rimbo, tikki-tikki-rimbo-rimbo-rimbo, allamentapantico bonasco Schutz ran to his father and cried:

"Oh, father, Joy has fallen into the well!"

"What?" asked the father, who was deaf.

"Oh, father, Joy has fallen into the well!"

Then the father cried to the hired man and said:

"Fetch the ladder; Joy has fallen down the well."

And they ran as fast as they could, and put the long ladder down the well, and the father climbed down and brought up Joy, who was *very* wet, but not hurt at all.

The next day the children were playing out in the yard again, and Tikki-tikki-rimbo-rimbo-rimbo, tikki-tikki-rimbo-rimbo-rimbo, allamentapantico bonasco Schutz fell down the well. Joy ran to her father, crying—

"Oh, father, Tikki-tikki-rimbo-rimbo-rimbo, tikki-tikki-rimbo-rimbo-rimbo, allamentapantico bonasco Schutz has fallen into the well!"

"What did you say?" asked the father, who was *still* deaf.

"Oh, father," repeated Joy, "Tikki-tikki-rimbo-rimbo-rimbo, tikki-tikki-rimbo-rimbo-rimbo, allamentapantico bonasco Schutz has fallen into the well!"

Then the father called to the hired man and said:

"Fetch the ladder; Tikki-tikki-rimbo-rimbo-rimbo, tikki-tikki-rimbo-rimbo-rimbo, allamentapantico bonasco Schutz has fallen into the well!"

And they ran as fast as they could, and put the ladder down, but by the time they reached him poor little Tikki-tikki-rimbo-rimbo-rimbo, tikki-tikki-rimbo-rimbo-rimbo, allamentapantico bonasco Schutz was dead.

SUMMER STORIES

A Little Dutch Hero

Holland is a little country, but the Dutch children love it just as much as you love your great, big country. There are many curious things to be seen there—the wooden shoes and the windmills and the odd little caps and the far-reaching gardens of tulips; but the most curious of all are the dikes which hold back the sea. For Holland is lower than the ocean, and parts of it would be flooded every time the tide rises were it not for these great walls which the people have built.

Little Hans knew what a dreadful thing it would be if the sea ever pushed through these walls; and when he walked or played with his little brother along the dikes he used to tell him stories of how the sea tried and tried and tried to get into Holland, because Holland was so beautiful, and how the brave dikes kept it out.

One day Hans and his little brother had wandered in their playing very far from home—so far that Hans had grown tired, and climbed up on the dike to rest. The little brother was playing with stones at the foot of the dike. Suddenly he called out.

"Oh, Hans, what a funny little hole!"

"A hole," repeated Hans. "Where?"

"Right here," said the brother. "There's water in it."

Hans's heart almost stopped beating as he slid down the dike, and he was still more frightened when he saw the hole. It was a very little hole, to be sure, but the water was oozing through drop by drop; and Hans knew how quickly the angry

"YOU SHALL NOT COME IN," HE SAID

sea could tear a great hole if it were given the tiniest opening. He looked about, but there was no one in sight. And when he looked back at the hole he could see that it had grown larger, so that now the water was trickling through in a little stream.

Hans thrust his forefinger into the hole, and found that it fitted exactly. Then he turned to his little brother.

"Run," he said; "run home as fast as you can and tell father that the dike is leaking."

The little fellow started off as fast as his short legs would carry him, and Hans was left alone, waiting and waiting. On the other side of the dike the sea seemed to be muttering to itself as it splash—splash—splashed against the wall.

"I *will* come in—I *will* come in," it seemed to be saying.

Hans thrust his finger in deeper.

"You shall *not* come in—you shall *not* come in," he said aloud.

That was at first, when he was very brave, but later, when little brother could be seen no longer and when his finger began to grow cold and numb, he just kept very still, with his eyes on the road. Then his hand grew numb, and his arm and shoulder, and finally it seemed to him that his whole body was frozen. Sharp cramp pains ran up his arm and down his side, and the sea seemed to be laughing at him for setting his little strength against its great power. Once he almost pulled his finger out, but then he thrust it in farther than ever, and leaned his head against the dike.

O, how long it seemed before, far off down the road, he saw a black spot. It was moving—it was coming nearer and nearer; and at last he could see his father and the neighbors, and could hear them shouting, "We're coming! We're coming!"

Very tenderly they drew out Hans's numb finger, and while they mended the dike with their pickaxes and shovels they praised him for his bravery and told him that he was a real hero. And when the work was done they marched home like an army, two and two, singing, and Hans rode on his father's shoulders.

And if you lived in Haarlem you would hear to this day the story of the brave boy who held back the sea.

The Flax

The Flax stood in blossom; it had pretty little blue flowers, delicate as a moth's wings and even more delicate. The sun shone on the Flax, and the rain clouds moistened it, and this was just as good for it as it is for little children when they are washed, and afterward get a kiss from their mother; they become much prettier, and so did the Flax.

"The people say that I stand uncommonly well," said the Flax, "and that I'm fine and long, and shall make a capital piece of linen. How happy I am! I'm certainly the happiest of beings. How well I am off! And I may come to something! How the sunshine gladdens, and the rain tastes good and refreshes me! I'm wonderfully happy; I'm the happiest of beings."

"Yes, yes, yes!" said the Hedge-stake. "You don't know the world, but we do, for we have knots in us;" and then it creaked out mournfully—

"Snip-snap-snurre,
Bassellurre!
The song is done."

"No, it is not done," said the Flax. "To-morrow the sun will shine, or the rain will refresh us. I feel that I'm growing. I feel that I'm in blossom! I'm the happiest of beings."

But one day the people came and took the Flax by the head and pulled it up by the root. That hurt; and it was laid in water as if they were going to drown it, and then put on the fire as if it was going to be roasted. It was quite fearful!

"One can't always have good times," said the Flax. "One must make one's experiences, and so one gets to know something."

But bad times certainly came. The Flax was moistened, and roasted, and broken, and hackled. Yes, it did not even know what the operations were called that they did with it. It was put on the spinning wheel—whirr! whirr! whirr!—it was not possible to collect one's thoughts.

"I have been uncommonly happy," it thought in all its pain. "One must be content with the good one has enjoyed. Contented! contented!

O!" And it continued to say that when it was put into the loom, and till it became a large, beautiful piece of linen. All the Flax, to the last stalk, was used in making one piece.

"But this is quite remarkable! I should never have believed it! How favorable fortune is to me! The Hedge-stake is well informed, truly, with its—

'Snip-snap-snurre,
Bassellurre!'

The song is not done by any means. Now it's beginning in earnest. That's quite remarkable! If I've suffered something, I've been made into something! I'm the happiest of all! How strong and fine I am, how white and long! That's something different from being a mere plant: even if one bears flowers, one is not attended to, and only gets watered when it rains. Now I'm attended to and cherished; the maid turns me over every morning, and I get a shower bath from the watering pot every evening. Yes, the clergyman's wife has even made a speech about me, and says I'm the best piece in the whole parish. I cannot possibly be happier!"

Now the Linen was taken into the house, and put under the scissors: how they cut and tore it, and then pricked it with needles! That was not pleasant; but twelve pieces of body linen of a kind not often mentioned by name, but indispensable to all people, were made of it—a whole dozen!

"Just look! Now something has really been made of me! So; that was my destiny. That's a real blessing. Now I shall be of some use in the world, and that's right, that's a true pleasure! We've been made into twelve things, but yet we're all one and the same; we're just a dozen: how charming that is!"

Years rolled on, and now they would hold together no longer.

"It must be over one day," said each piece. "I would gladly have held together a little longer, but one must not expect impossibilities."

They were now torn into pieces and fragments. They thought it was all over now, for they were hacked to shreds, and softened, and boiled; yes, they themselves did not know all that was done to them; and then they became beautiful white paper.

"Now, that is a surprise, and a glorious surprise!" said the Paper. "Now I'm finer than before, and I shall be written on: that is remarkable good fortune."

And really the most beautiful stories and verses were written upon it, and only once there came a blot; that was certainly remarkable good fortune. And the people heard what was upon it; it was sensible and good, and made people much more sensible and better; there was a great blessing in the words that were on this Paper.

"That is more than I ever imagined when I was a little blue flower in the fields. How could I fancy that I should ever spread joy and knowledge among men? I can't yet understand it myself, but it really is so. I have done nothing myself but what I was obliged, with my weak powers, to do for my own preservation, and yet I have been promoted from one joy and honor to another. Each time when I think 'the song is done,' it begins again in a higher and better way. Now I shall certainly be sent about to journey through the world, so that all people may read me. That cannot be otherwise; it's the only probable thing. I have splendid thoughts, as many as I had pretty flowers in the old time. I'm the happiest of beings."

But the Paper was not sent on its travels—it was sent to the printer, and everything that was written upon it was set up in type for a book, or rather for many hundreds of books, for in this way a very far greater number could derive pleasure and profit from the book than if the one paper on which it was written had run about the world, to be worn out before it had got half way.

"Yes, that is certainly the wisest way," thought the Written Paper. "I really did not think of that. I shall stay at home, and be held in honor, just like an old grandfather; and I am really the grandfather of all these books. Now something can be effected; I could not have wandered about thus. He who wrote all this looked at me; every word flowed from his pen right into me. I am the happiest of all."

Then the Paper was tied together in a bundle, and thrown into a tub that stood in the washhouse.

"It's good resting after work," said the Paper. "It's very right that one should collect one's thoughts. Now I'm able for the first time to think of what is in me, and to know one's self is true progress. What will be done with me now? At any rate I shall go forward again: I'm always going forward; I've found that out."

Now, one day all the Paper was taken out and laid by on the hearth; it was to be burned, for it might not be sold to hucksters to be used for covering for butter and sugar, they said. And all the children in the house stood round about, for they wanted to see the Paper burn, that flamed so prettily, and afterwards one could see many red sparks among the ashes, careering here and there. One after another faded out as quick as the wind, and that they called "seeing the children come out of school," and the last spark was the old schoolmaster: one of them thought he had already gone, but the next moment there came another spark. "There goes the schoolmaster!" they said. Yes, they knew all about it; they should have known who it was who went there: we shall get to know it, but they did not. All the old Paper, the whole bundle, was laid upon the fire, and it was soon alight. "Ugh!" it said, and burst out into bright flame. Ugh! that was not very agreeable, but when the whole was wrapped in bright flames, these mounted up higher than the Flax had ever been able to lift its little blue flowers, and glittered as the white Linen had never been able to glitter. All the written letters turned for a moment quite red, and all the words and thoughts turned to flame.

"Now I'm mounting straight up to the sun," said a voice in the flame; and it was as if a thousand voices said this in unison; and the flames mounted up through the chimney and out at the top, and more delicate than the flames, invisible to human eyes, little tiny beings floated

there, as many as there had been blossoms on the Flax. They were lighter even than the flame from which they were born; and when the flame was extinguished, and nothing remained of the Paper but black ashes, they danced over it once more, and where they touched the black mass the little red sparks appeared. The children came out of school, and the schoolmaster was the last of all. That was fun! and the children sang over the dead ashes—

"Snip-snap-snurre,
Bassellurre!
The song is done."

But the little invisible beings all said—

"The song is never done, that is the best of all. We know it, and therefore we're the happiest of all."

But the children could neither hear that nor understand it; nor ought they, for children must not know everything.

The First Woodpecker

Adapted from Phoebe Cary's poem.

Long ago there lived at the edge of the woods, in a little old house, a tiny old woman. Her house was very neat and clean, and she was very neat and clean, with her shiny black dress, her rustling white apron with its big bow in back, and her gay little red cap. The little old woman did no one any harm, but because she had lived so long by herself she had grown very selfish, and wanted to keep every good thing she could put her hands on for herself.

One day in the summer the little old woman was baking cakes. They were brown and spicy and full of plums, and they smelled—oh, so good! At least, that's what the hungry old man thought who came along the road and smelled the cakes through the open door.

He went to the door and knocked, and when the old lady appeared he bowed to her most politely.

"Please, old lady," he said, "will you give me a cake? I am old, and have had nothing to eat for a long time."

"Just wait," said the little old lady, "and I'll bake you one." "For," said she to herself, "he shall not have one of these big cakes; I'll bake him a little one."

So she took a little piece of dough and put it into the oven; but when she took it out it was as big a cake, and as brown and crispy, as any she had baked before.

"That will never do," she said to herself, and she put the cake on the very top shelf.

Then she took a smaller piece of dough—only a teaspoonful—and made a little cake and thrust it into the oven; but when she opened the door she found that it had swelled and swelled until it was as big as the last one.

"Dear, dear," said the little old woman; "I just must have this one for myself." And she put it on the top shelf.

This time she pinched off a tiny, tiny piece of dough, so small that she could scarcely pat it out into a cake at all. But when she took it out of the oven it was the biggest cake of all, and instead of the one plum which had been in the dough there were plums and plums, just crowding each other.

This was too much. The old woman quickly hid the cake, and snatched up a piece of dry bread, which she handed to the poor man. He said nothing, though he had noticed all that had happened.

When he had gone the old woman felt very badly, for she was really not a bad old woman after all. "I wish," she said, "that I were a bird, so that I might take the hungry man one of these nice cakes."

And then a curious thing happened. The tiny old woman grew smaller and smaller; her neat black dress and white apron and red cap turned to feathers, and she flew out of the window of her little old house.

And now you may hear her any day in the woods, peck, peck, pecking; and you may see her still, in her gay clothes, climbing up the tree trunks, hunting in every hole for food. For she has become a red-headed woodpecker, and must find her food wherever she can.

AUTUMN STORIES

The Coming of the Corn

Adapted from *Hiawatha.*

Hiawatha wanted, more than anything else in the world, the good of his people—that Indian tribe which he loved better than himself. As he wandered in the woods he saw the squirrel and the wild goose, the strawberry and the wild grape, and heard the splash of the fish in the river; but he wanted for his people something different, something better than all these.

And so he built a lodge in the forest, far away from his people, and there for seven days and seven nights he fasted, all the time sending up prayers to the Great Spirit for the good of his people. On the fourth day, as he lay half faint with hunger on his bed of leaves, he looked out between the poles of his wigwam and saw approaching through the radiance of the sunset a youth whom he had never seen before.

The young man was tall and straight, and so supple that he swayed in the wind like a sapling. His garments were green and yellow, his hair was long and yellow, and above his forehead green plumes waved. As Hiawatha lay wondering whether this were vision or reality, the youth approached and spoke to him.

"Hiawatha, your prayer has been answered, because it is not a selfish prayer, but asks for the good of your people. I, Mondamin, have been sent to show you how, with labor and struggle, that great good for which you pray may come. Rise and wrestle with me."

Weakly Hiawatha rose, but with the first touch of the stranger he felt himself grow stronger, and more and more strength came to him as they wrestled till the sunset light was gone.

"Enough," cried Mondamin. "You have wrestled well, Hiawatha; to-morrow, at the same hour, I shall come again to try my strength with yours."

With the words he was gone, and Hiawatha's strength went with him. But the next day, and the next, when the sky was reddest with the sunset, Mondamin came again and wrestled with Hiawatha. Just before he vanished on that third day he said, "To-morrow is the day of your

triumph. You will conquer me, and then you must lay me in a shallow grave, where the gentle rain and the warm sun may reach me. But first take from me my green and yellow garments."

And on the fourth day it happened as he had said. Hiawatha felt his strength coming to him in great waves, and he wrestled with such power that suddenly, before he knew how it had happened, Mondamin lay before him on the grass, dead.

WON AS A GIFT FOR HIS PEOPLE

Not quite understanding, but willing to obey, Hiawatha stripped the soiled and torn garments from the young stranger and laid him under the soft mold. For days he watched beside the grave, keeping the earth soft above it, driving away the ravens, and pulling out the weeds. And at last, one morning, he saw peeping through the soft black earth a tiny point of green. Soon it was a long green spear, and before the summer was over there stood above the grave where Mondamin had been laid the first maize plant, with its waving green plumes and its yellow, silken tresses—the wonderful Indian corn, which Hiawatha had won as a gift for his people.

The Queer Little Baker Man

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All the children were glad when the Little Baker came to town and hung the sign above his queer little brown shop.

"THANKSGIVING LOAVES TO SELL."

Each child ran to tell the news to another child, until soon the streets echoed with the sound of many running feet, and the clear November air was full of the sound of happy laughter, as a crowd of little children thronged as near as they dared to the Little Baker's shop, while the boldest crept so close that they could feel the heat from the big brick oven, and see the gleaming rows of baker's pans.

The Little Baker said never a word. He washed his hands at the windmill waterspout and dried them, waving them in the crisp air. Then he unfolded a long spotless table, and setting it up before his shop door, he began to mold the loaves, while the wondering children drew nearer and nearer to watch him.

He molded big long loaves, and tiny round loaves; wee loaves filled with currants; square loaves with queer markings on them; fat loaves and flat loaves and loaves in shapes such as the children had never seen before, and always as he molded, he sang a soft tune to these words:

"Buy my loaves of brown and white
Molded for the child's delight.
Who forgets another's need
Eats unthankful and in greed;
But the child who breaks his bread
With another, Love has fed."

By and by the children began to whisper to each other.

"I shall buy that very biggest loaf," said the Biggest Boy. "Mother lets me buy what I wish. I shall eat it alone, which is fair if I pay for it."

"Oh," said the Tiniest Little Girl, "that would be greedy. You could never eat so big a loaf alone."

"If I pay for it, it is mine," said the Biggest Boy, boastfully, "and one need not share what is his own, unless he wishes."

"Oh," said the Tiniest Little Girl, but she said it more softly this time, and she drew away from the Biggest Boy and looked at him with eyes that had grown big and round.

"I have a penny," she said to the Little Lame Boy, "and you and I can have one of those wee loaves together. They have currants in them, so we shall not mind if the loaf is small."

"No, indeed," said the Little Lame Boy, whose face had grown wistful when the Biggest Boy talked of the great loaf. "No, indeed, but you shall take the bigger piece."

Then the Little Baker raked out the bright coals from the great oven into an iron basket and he put in the loaves, every one, while the children crowded closer, with eager faces.

When the last loaf was in, he shut the oven door with a clang so loud and merry that the children broke into a shout of laughter.

Then the Queer Little Baker came and stood in his tent door, and he was smiling; and he sang again a merry little tune to these words:

"Clang! clang! my oven floor
My loaves will bake as oft before,
And you may play where shines the sun
Until each loaf is brown and done."

Then away ran the children, laughing and looking back at the door of the shop where the Queer Little Baker stood and where the raked out coals, bursting at times, cast long red lights against the brown walls; and as they ran they sang the Queer Little Baker's merry song:

"Clang! clang! my oven floor
The loaves will bake as oft before."

Then some played at hide and seek among the sheaves of ungarnered corn, and some ran gleefully through the heaped up leaves of russet and gold for joy to hear them rustling. But some, eager, returned home for pennies to buy a loaf when the Queer Little Baker should call.

So the hour passed, till, above the sound of the rustling corn, and the sounds of all other voices the children heard the Little Baker's call:

"The loaves are ready, white and brown,
For every little child in town,
Come buy Thanksgiving loaves and eat,
But only Love can make them sweet."

Soon all the air was filled with the sound of swift-running feet, as the children flew like a cloud of leaves blown by the wind in answer to the Queer Little Baker's call. When they came to his shop they paused, laughing and whispering, as the Little Baker laid out the loaves on the spotless table.

"This is mine," said the Biggest Boy, and laying down a silver coin he snatched the great loaf and ran away to break it by himself.

Then came the Impatient Boy, crying:

"Give me my loaf. This is mine, and give it to me at once. Do you not see my coin is silver? Do not keep me waiting."

The Little Baker said never a word. He did not smile, he did not frown, he did not hurry. He gave the Impatient Boy his loaf and watched him, as he, too, hurried away to eat his loaf alone.

Then came others crowding and pushing with their money, the strongest and rudest gaining first place; and snatching each a loaf, they ran off to eat without a word of thanks, while some very little children looked on wistfully, not able even to gain a place. All this time the Queer Little Baker kept steadily on, laying out the beautiful loaves on the spotless table.

A Gentle Lad came, when the crowd grew less, and, giving all the pennies he had, he bought loaves for all the little ones; so that, by and by, no one was without a loaf. The Tiniest Little Girl went away, hand in hand with the Little Lame Boy to share his wee loaf, and both were smiling, and whoever broke one of those smallest loaves found it larger than it had seemed at first.

But now the Biggest Boy was beginning to frown.

"This loaf is sour," he said angrily.

"But is it not your own loaf," said the Baker, "and did you not choose it yourself, and choose to eat it alone? Do not complain of the loaf, since it is your own choosing."

Then those who had snatched the loaves ungratefully and hurried away, without waiting for a word of thanks, came back.

"We came for good bread," they cried, "but those loaves are sodden and heavy."

"See the lad there with all those children. His bread is light. Give us, too, light bread and sweet."

But the Baker smiled a strange smile.

"You chose in haste," he said, "as those choose who have no thought in sharing. I cannot change your loaves. I cannot choose for you. Had you, buying, forgotten that mine are Thanksgiving loaves? I shall come again; then you can buy more wisely."

Then these children went away thoughtful.

But the very little children and the Gentle Lad sat eating their bread with joyous laughter, and each tiny loaf was broken into many pieces as they shared with each other, and to them the bread was as fine as cake and as sweet as honey.

Then the Queer Little Baker brought cold water and put out the fire. He folded his spotless table and took down the boards of his little brown shop, and packed all into his wagon and drove away, singing a quaint tune. Soft winds rustled the corn and swept the boughs together with a musical chuckling. And where the brown leaves were piled thickest, making a little mound, sat the Tiniest Little Girl and the Little Lame Boy eating their sweet currant loaf happily together.

Androcles and the Lion

A story of gratitude

Long, long ago, in Rome, the great theater was crowded to the very top. The emperor, in his gorgeous purple robe, sat in his box with his attendants about him, and all the people, in their best clothes, sat on the marble seats, fairly holding their breath with excitement. For they were to see the sport that they liked best of all—a very cruel sport it would seem to us. A runaway slave, who had been recaptured, was to be torn to pieces by a lion, and from the iron cage the roars of the savage beast could be heard from time to time.

Now the slave was led in, trembling. He fell on his knees in the center of the arena, and raised his clasped hands, pleading for mercy, towards the emperor, but the emperor's eyes were cold and hard, and the people shouted, "The lion! Bring in the lion."

Suddenly the great doors of the cage beneath the imperial box swung outward. There was a breathless pause, and then, slowly, as though he knew his prey could not escape him, the lion stepped out onto the sand of the arena. He was a lean and hungry lion, for he had been kept without food that he might be the more savage and furnish better sport for the spectators. O, how powerful his claws looked, and how the people who were safe on the high seats trembled as he snarled and showed his white teeth.

A moment he stood there, lashing his sides with his tail and turning his shaggy head from side to side. And then, suddenly, he spied the slave, crouched on the sand, with bowed head. The great cat began to creep slowly toward his prey, switching his tail and narrowing his eyes. The people scarcely breathed; would he never spring? Yes, he was crouching now for his leap! Just then the slave raised his head, and the lion, his powerful muscles already released for the spring, checked himself and fell short. And, marvel of marvels, instead of rushing at the cowering slave with steel claws out, the lion fairly groveled in the sand before him! He rubbed against the man and fondled him with his paws, while the noise of his mighty purring reached to the farthest part of the great theater.

Then how the people shouted! And the emperor, leaning over the railing of his box, beckoned to the slave to come near. With his hand on the lion's head, the slave approached.

"Are you a worker of magic," queried the emperor, "or how have you tamed the most savage beast of the jungle?"

"Oh, most gracious majesty," replied the slave—for he was a learned slave and knew how to speak to an emperor—"thou knowest that I escaped from a most cruel master and fled to Africa. There I hid in a cave on the edge of the desert, and one day there came into my cave a great lion.

"He whined and held up his paw, and I saw, sticking in it, a long thorn. Because I have always loved animals and cannot bear to see one suffer, I conquered my fear and drew out the thorn, and the beast, after licking my hands, left me.

"Thou knowest, too, most gracious sire, that I was taken and brought back to Rome, and condemned to be torn to pieces by a lion. This lion has a better memory than I have—I did not recognize him, but he knew me, and has spared my life, as thou hast seen."

The slave ceased, and the people, who had heard enough to guess at what had happened, sent up a mighty shout.

"Life and freedom! Life and freedom for the slave!" they cried.

And the emperor, to please himself as well as to please the people, said, "So great a marvel has never been seen in Rome. Both are free—the lion and the slave—and no man may again lay hands on them."

And with his hand still on the lion's head, the freed slave walked out.

The Larks in the Cornfield

Once upon a time there lived in a great big cornfield a happy Lark family—a mother Lark and her little baby Larks. It was a beautiful, quiet place to live, but the mother Lark had one worry; she knew that when the corn was ripe and the reapers came, their sharp scythes and their heavy shoes would hurt the little Larks. So she watched and listened very carefully, and when she had to leave the nest to gather food she told the little Larks to watch and listen very carefully for any sign of the reapers' coming.

One day she came home and found the little Larks almost fluttering out of the nest in their excitement.

"Oh, mother, mother," they cried as soon as they could see her. "Take us away, take us away at once. To-day the farmer was walking with his sons in the cornfield, and he said, 'The corn is ripe and must be cut; let us get our neighbors to help us.' And he told his sons to go at once and ask all the neighbors to come to-morrow and help him reap his corn."

"Is that all?" laughed the mother Lark. "We'll not move to-day, and you needn't be frightened at all; for if he waits for his neighbors to come and do his reaping we are safe for some time. Listen carefully to-morrow and tell me what he says."

The next evening when she came home she found the little Larks chattering and chirping with fear.

"Mother, dear mother," they cried all together, "you must surely move us now. To-day the farmer walked again in his cornfield, and we heard him say, 'This corn is *very* ripe; we cannot wait for our neighbors now. Go, my sons, and ask your uncles and your cousins and your grandfathers to come to-morrow and help us cut the corn.' And they went—we saw them go. Oh, mother, surely you will move us to-night."

But the mother Lark only laughed. "No," she said, "we'll not go to-night. We are safe enough yet. The uncles and cousins and grandfathers will be so busy cutting their own corn that they'll not disturb our field for a time. Go to sleep, my babies, but listen carefully to-morrow."

The third evening the mother Lark came home and the little ones said, "To-day when the farmer came to his cornfield he was quite angry and gruff. 'This corn will be ruined; it's getting far too ripe,' he said, 'we'll wait no longer for our neighbors and our relatives—we'll cut the corn ourselves.' And he called his sons and sent them out to hire reapers to come and reap the corn to-morrow. But we weren't frightened, mother, for we know now that he never means what he says."

"Indeed," said the mother Lark, beginning to bustle about, "he means it *this* time. When a man attends to his own business instead of waiting for someone else to do it, the business gets done. Come, children, we are moving out to-night."

• WINTER STORIES

The Ant and the Grasshopper

There was once a foolish little Grasshopper that spent all her time playing. Through the long summer and autumn she did nothing but sing from morning till night. So when winter came and the snow covered the ground, she hadn't a morsel of food stored away in her house.

Soon she was so faint with hunger that she begged her neighbor, the Ant, to give her something to eat. "I am starving," she said; "give me a grain of wheat."

"Why did you not save some grain at harvest time?" asked the Ant. "There was plenty to be had. What were you doing?"

"I was singing," answered the Grasshopper, "I had no time for work."

"Holty tolty!" cried the Ant; "if you sang all summer you must dance hungry to bed in winter."

The Fir Tree

Out in the forest stood a pretty little Fir Tree. It had a good place; it could have sunlight, air there was in plenty, and all around grew many larger comrades—pines as well as firs. But the little Fir Tree wished ardently to become greater. It did not care for the warm sun and the fresh air; it took no notice of the peasant children, who went about talking together, when they had come out to look for strawberries and raspberries. The children often came with a whole basketful, or with a string of berries which they had strung on a straw. Then they would sit down by the little Fir Tree and say, "How pretty and small this one is!" The Fir Tree did not like that at all.

Next year he had grown bigger, and the following year he was taller still.

"Oh, if I were only as tall as the others!" sighed the little Fir. "Then I would spread my branches far around and look out from my crown into the wide world. The birds would then build nests in my boughs, and when the wind blew I would nod grandly."

It took no pleasure in the sunshine, in the birds, or in the red clouds that went sailing over it morning and evening.

When it was winter, and the snow lay all around, white and sparkling, a hare would often come jumping along and spring right over the little Fir Tree. Oh, that made him so angry! But two winters went by, and when the third came, the little Tree had grown so tall that the hare was obliged to run around it.

"Oh, to grow, to grow, and become old; that's the only fine thing in the world," thought the Tree.

In the autumn the woodcutters always came and felled a few of the largest trees; that was done this year too, and the little Fir Tree, that was now quite well grown, shuddered with fear, for the stately trees fell to the ground with a crash, and their branches were cut off, so that the trees looked quite naked, long and slender, and could hardly be recognized. Then they were laid upon wagons, and the horses dragged them away out of the wood. Where were they going? What destiny awaited them?

In the spring, when the Swallows and the Stork came, the Tree asked them, "Do you know where the big firs were taken? Did you meet them?"

The Swallows knew nothing about it, but the Stork looked thoughtful, nodded his head and said:

"Yes, I think so. I met many new ships when I flew out of Egypt; on the ships were tall masts; I fancy these were the trees. They smelt like fir. I can assure you they're stately—very stately."

"Oh, that I were big enough to go over the sea. What kind of a thing is this sea, and how does it look?"

"It would take long to explain all that," said the Stork, and he went away.

"Rejoice in thy youth," said the Sunbeams; "rejoice in thy fresh growth, and in the young life that is within thee."

And the Wind kissed the Tree, and the Dew wept tears upon it; but the Fir Tree did not understand.

When Christmas time approached, quite young trees were felled, sometimes trees which were neither so old nor so large as this Fir Tree, that never rested, but always wanted to go away. These beautiful young trees kept all their branches; they were put upon wagons, and horses dragged them away out of the wood.

"Where are they all going?" asked the Fir Tree. "They are not greater than I—indeed, one of them was much smaller. Why do they keep all their branches? Whither are they taken?"

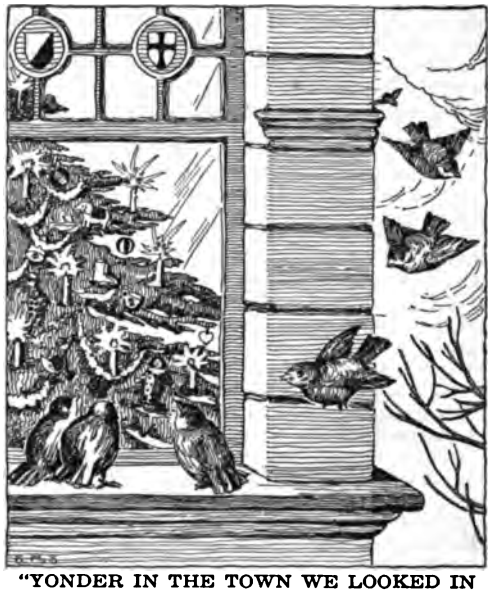
"We know that! We know that!" chirped the Sparrows. "Yonder in the town we looked in at the windows. We know where the fir trees go. We have looked in at the windows and have seen that they are planted in the middle of a warm room and dressed up in the greatest splendor with the most beautiful things—gilt apples, honey cakes, playthings, and many hundreds of candles."

"And then?" asked the Fir Tree, trembling through all its branches. "And then? what happens then?"

"Why, we have not seen anything more. But it was wonderful!"

"Perhaps I may be destined to this glorious end one day!" cried the Fir Tree, rejoicing.

"That is even better than traveling across the sea. How I long for it! If it were only Christmas! Now I am great and grown-up, like the rest who were led away last year. Oh, if I were only on the wagon! If I were only in the warm room amidst all the pomp and splendor! And



"YONDER IN THE TOWN WE LOOKED IN AT THE WINDOWS"

then? Yes, then something even better will come, something far more charming, else why should they adorn me so? There must be something grander, something greater still to come; but what? Oh! I'm suffering, I'm longing! I don't know myself what is the matter with me!"

"Rejoice in us," said Air and Sunshine. "Rejoice in thy fresh youth here in the woodland."

The Fir Tree did not rejoice at all, but it grew and grew; winter and summer it stood there, green, dark green. The people who saw it said, "That's a handsome tree!" and at Christmas time it was felled before any of the others. The ax cut deep into its marrow, and the tree fell to the ground with a sigh; it felt a pain, a sensation of faintness, and could not think at all of happiness, for it was sad at parting from its home, from the place where it had grown up; it knew that it should never again see the dear old companions, the little bushes and the flowers all around, perhaps not even the birds.

The Tree came to itself only when it was unloaded in a yard, with other trees, and heard a man say:

"This one is famous; we want only this one for our Christmas!"

Now two servants came in gay liveries, and carried the Fir Tree into a large, beautiful room. All around the walls hung pictures, and by the great stove stood large Chinese vases with lions on the covers; there were rocking-chairs, silken sofas, great tables covered with picture books, and toys worth a hundred times a hundred dollars; at least, the children said so. And the Fir Tree was put into a great tub filled with sand; but no one could see that it was a tub, for it was hung round with green cloth, and stood on a large, many-colored carpet. Oh, how the Tree trembled! What was to happen now? The servants, and the young ladies also, decked it out. On one branch they hung little bags cut out of colored paper, and every bag was filled with sweetmeats. Golden apples and walnuts hung down as if they grew there, and more than a hundred little candles, red, white, and blue, were fastened to the different boughs. Dolls that looked exactly like real people—the Tree had never seen such before—swung among the foliage, and high on the summit of the Tree was fixed a tinsel star. It was splendid.

"This evening," said all, "this evening it will shine."

"Oh," thought the Tree, "that it were evening already! Oh, that the lights may be soon lit! When will that be done? I wonder if trees will come out of the forest to look at me? Will the Sparrows fly against the panes? Shall I grow fast here, and stand adorned in summer and winter?"

But the Tree had a backache from mere longing, and the backache is just as bad for a tree as the headache for a person.

At last the candles were lighted. What a brilliance! what a splendor! The Tree trembled so in all its branches that one of the candles set fire to a green twig, and it was scorched, but one of the young ladies hastily put the fire out.

Now the Tree might not even tremble. Oh, that was terrible! It was so afraid of setting fire to some of its ornaments, and it was quite bewildered with all the brilliance. And now the folding doors were thrown open, and a number of children rushed in as if they would have overturned the whole Tree, while the older people followed more deliberately. The little ones stood quite silent, but only for a minute; then they shouted till the room rang; they danced gleefully round the Tree, and one present after another was plucked from it.

"What are they about?" thought the Tree. "What's going to be done?"

And the candles burned down to the twigs, and as they burned down they were extinguished, and then the children were given permission to plunder the Tree. They rushed in upon it, so that every branch cracked again; if it had not been fastened by the top and by the golden star to the ceiling, the Tree certainly would have fallen down.

The children danced about with their pretty toys. No one looked at the Tree except one old man, who came up and peeped among the branches, but only to see if a fig or an apple had not been forgotten.

"A story! A story!" shouted the children, as they drew a little fat man toward the Tree. He sat down just beneath it—"for then we shall be in the green wood," said he, "and the Tree may have the advantage of listening to my tale. But I can tell only one. Will you hear the story of Ivede-Avede, or of Klumpey-Dumpey, who fell downstairs, and still was raised up to honor and married the princess?"

"Ivede-Avede," cried some; "Klumpey-Dumpey," cried others, and there was a great crying and shouting. Only the Fir Tree was silent, and thought, "Shall I not be in it? Shall I have nothing to do in it?" But he had been in the evening's amusement and had done what was required of him.

And the fat man told about Klumpey-Dumpey, who fell downstairs, and yet was raised to honor and married the princess. And the children clapped their hands, and cried, "Tell another, tell another!" for they wanted to hear about Ivede-Avede; but they got only the story of Klumpey-Dumpey.

The Fir Tree stood quite silent and thoughtful; never had the birds in the wood told such a story as that; Klumpey-Dumpey fell downstairs, and yet came to honor and married the princess at last!

"Yes, so it happens in the world!" thought the Fir Tree, and believed it must be true, because that was such a nice man who told it.

"Well, who can know? Perhaps I shall fall downstairs, too, and marry a princess!" And it looked forward with pleasure to being adorned again, the next evening, with candles and toys, gold and fruit. "To-morrow I shall not tremble," it thought. "I shall rejoice in all my splendor. To-morrow I shall hear the story of Klumpey-Dumpey again, or perhaps that of Ivede-Avede, too."

And the Tree stood all night quiet and thoughtful.

In the morning the servants and the chambermaid came in.

"Now my splendor will begin afresh," thought the Tree.

But they dragged him out of the room and upstairs to the garret, and there they put him in a dark corner where no daylight shone.

"What's the meaning of this?" thought the Tree. "What am I to do here? What is to happen?"

And he leaned against the wall, and thought, and thought. And he had time enough, for days and nights went by, and nobody came up; and when at length some one came, it was only to put some great boxes in a corner. Now the Tree stood quite hidden away, and the supposition is that it was quite forgotten.

"Now it's winter outside," thought the Tree. "The earth is hard and covered with snow, and people cannot plant me; therefore I suppose I'm to be sheltered here until spring comes. How considerate that is! How good people are! If it were only not so dark here, and so terribly solitary! Not even a little hare! It was pretty out there in the wood, when the snow lay thick and the hare sprang past; yes, even when he jumped over me; but then I did not like it. It is terribly lonely up here!"

"Piep! Piep!" said a little Mouse, and crept forward, and then came another little one. They smelt at the Fir Tree, and then slipped among the branches.

"It's horribly cold," said the two little Mice, "or else it would be comfortable here. Don't you think so, old Fir Tree?"

"I'm not old at all," said the Fir Tree. "There are many much older than I."

"Where do you come from?" asked the Mice. "And what do you know?" They were dreadfully inquisitive.

"Tell us about the most beautiful spot on the earth. Have you been there? Have you been in the storeroom, where cheeses lie on the shelves, and hams hang from the ceiling; where one dances on tallow candles, and goes in thin and comes out fat?"

"I don't know that," replied the Tree; "but I know the wood, where the sun shines and the birds sing."

And then it told all about its youth.

And the little Mice had never heard anything of the kind; and they listened, and said:

"What a number of things you have seen! How happy you must have been!"

"I?" replied the Fir Tree; and it thought about what it had told. "Yes, those were really quite happy times." But then he told of the Christmas Eve, when he had been hung with sweetmeats and candles.

"Oh!" said the little Mice, "how happy you have been, you old Fir Tree!"

"I'm not old at all," said the Tree. "I came out of the wood only this winter. I'm only rather backward in my growth."

"What splendid stories you can tell!" said the little Mice.

And next night they came with four other little Mice, to hear what the Tree had to relate: and the more it said, the more clearly did it remember everything, and thought, "Those were quite merry days. But they may come again. Klumpey-Dumpey fell downstairs, and yet he married the princess. Perhaps I may marry a princess, too!" And then the Fir Tree thought of a pretty little Birch Tree that grew out in the forest; for the Fir Tree, that Birch was a real princess.

"Who's Klumpey-Dumpey?" asked the little Mice.

And then the Fir Tree told the whole story. It could remember every single word; and the little Mice were ready to leap to the very top of the tree with pleasure. Next night a great many more Mice came, and on Sunday two Rats even appeared; but these thought the story was not pretty, and the little Mice were sorry for that, for now they also did not like it so much as before.

"Do you know only one story?" asked the Rats.

"Only that one," replied the Tree. "I heard that on the happiest evening of my life; I did not think then how happy I was."

"That's a very miserable story. Don't you know any about bacon and tallow candles—a storeroom story?"

"No," said the Tree.

"Then we'd rather not hear you," said the Rats.

And they went back to their own people. The little Mice at last also stayed away; and then the Tree sighed and said, "It was very nice when they sat around me, the merry little Mice, and listened when I spoke to them. Now that's past, too. But I shall remember to be pleased when they take me out."

But when did that happen? Why, it was one morning that people came and rummaged in the garret; the boxes were put away, and the Tree was brought out; they certainly threw him rather roughly on the floor, but a servant dragged him away at once to the stairs, where the daylight shone.

"Now life is beginning again," thought the Tree.

It felt the fresh air and the first sunbeams, and then it was out in the courtyard. Everything passed so quickly that the Tree quite forgot to look at itself, there was so much to look at all around. The courtyard was close to a garden, and there everything was blooming; the roses hung fresh and fragrant over the little paling, the linden trees were in blossom, and the swallows cried, "Quinze-wit! quinze-wit! my husband's come!" But it was not the Fir Tree that they meant.

"Now I shall live!" cried the Tree, rejoicingly, and spread its branches far out; but, alas! they were all withered and yellow, and it lay in the corner among nettles and weeds. The tinsel star was still upon it, and shone in the bright sunshine.

In the courtyard a couple of the merry children were playing who had danced round the Tree at Christmas time, and had rejoiced over it. One of the youngest ran up and tore off the golden star.

"Look at what is sticking to the ugly old Fir Tree!" said the child, and he trod on the branches till they cracked under his boots.

And the Tree looked at all the blooming flowers and the splendor of the garden, then looked at itself, and wished it had remained in the dark corner of the garret; it thought of its fresh youth in the wood, of the merry Christmas Eve, and of the little Mice which had listened so pleasantly to the story of Klumpey-Dumpey.

"Past! past!" said the old Tree. "Had I but rejoiced when I could have done so! Past! past!"

And the servant came and chopped the Tree into little pieces; a whole bundle lay there; it blazed brightly under the great brewing copper, and it sighed deeply, and each sigh was like a little shot; and the children, who were at play there, ran up, seated themselves by the fire, looked into it, and cried "Puff! puff!" But at each explosion, which was a deep sigh, the Tree thought of a summer day in the woods, or of a winter night there, when the stars beamed; he thought of Christmas Eve and of Klumpey-Dumpey, the only story he had ever heard or knew how to tell; and thus the Tree was burned.

The boys played in the garden, and the youngest had on his breast a golden star, which the Tree had worn on its happiest evening. Now that was past, and the Tree's life was past, and the story is past, too: past! past!—and that's the way with all stories.

The Little Match Girl

It was on a bitterly cold, snowy New Year's Eve. A little girl was wandering in the dark, cold streets; she was bareheaded and barefooted. She had certainly worn slippers when she left home, but they were not much good, for they were so huge. They had last been worn by her mother, and they fell off the child's feet when she was running across the street to avoid some carriages that were rolling by. One of the shoes could not be found at all; and the other was picked up by a boy who ran off with it, saying that it would do for a cradle when he had children of his own. So the poor little girl had to go on with her little bare feet, which were red and blue with cold.

She carried a quantity of matches in her apron, and she held a packet of them in her hand. Nobody had bought any of her during all the

HER LITTLE HANDS WERE STIFF WITH COLD

long day; nobody had given her a penny. The poor little creature was hungry and perishing with cold, and she looked the picture of misery. The snowflakes fell upon her long, yellow hair which curled so prettily about her face, but she paid no attention to that.

Lights were shining from every window, and there was a most delicious odor of roast goose in the streets, for it was New Year's Eve—she could not forget that. She found a corner where one house projected a little beyond the next one, and here she crouched, drawing up her feet under her, but she was colder than ever. She did not dare go home, for she had not sold any matches, and had not earned a single penny. Her father would beat her; besides it was almost as cold at home as it was here. They had only the roof over them, and the wind whistled through it, although they stuffed up the biggest cracks with rags and straw. Her little hands were stiff with cold.

Oh, one little match would do some good! Should she pull one out of the bundle and strike it on the wall to warm her fingers? She pulled one out. *Critch,* how it spluttered, how it blazed! It burned with a bright, clear flame just like a little candle when she held her hand round it.

It was a very curious candle, too. In its light the little girl fancied she was sitting in front of a big stove with polished brass feet and handles. There was a splendid fire blazing in it and warming her so beautifully, but—what happened?—just as she was stretching out her feet to warm them, the blaze went out, the stove vanished, and she was left sitting with the end of the burned-out match in her hand.

She struck a new one; it burned, blazed up, and where the light fell upon the wall it became transparent like gauze, and she could see right through it into the room. The table was spread with a snowy cloth and pretty china; a roast goose stuffed with apples and prunes was steaming on it. And what was even better, the goose hopped from the dish with the carving knife sticking in his back, and it waddled across the floor. It came right up to the poor child, and then—the match went out, and there was nothing left to be seen but the thick black wall.

Again, she lit another match. This time she was sitting under a lovely Christmas tree. It was much larger and more beautifully decorated than the one she had seen when she peeped through glass doors at the rich merchant's house this very last Christmas. Thousands of lighted candles gleamed upon its branches, and colored pictures such as she had seen in the shop windows looked down upon her. The little girl stretched out her hands to touch them, but—out went the match.

All the Christmas candles rose higher and higher, till she saw that they were only the twinkling stars.

So she struck another match against the wall, and this time it was her grandmother who appeared in the circle of the flame. She saw her quite clearly and distinctly, looking so gentle and happy.

"Grandmother!" cried the little creature, "Oh, do take me with you! I know you will vanish when the match goes out; you will vanish like the warm stove, and the goose, and the Christmas tree."

She hastily struck a whole bundle of matches, because she did so long to keep her grandmother with her. The light of the matches made it as bright as day. Grandmother had never before looked so big, nor so beautiful. She lifted the little match girl up in her arms, and they soared in a circle of light and joy, far, far above the earth, where there was no more cold, no hunger, no pain, for they were with God.

Supplementary List. SPRING STORIES. *What Was Her Name?* (Richards' *Five Minute Stories*); *Little Ida's Flowers* (Andersen); *Legend of the Arbutus.*

SUMMER STORIES. *Rhoecus* (adapted from Lowell's poem); *King of the Golden River* (Ruskin); *Five Peas in a Pod* (Andersen); the story of Joan of Arc; *Horatius at the Bridge* (from Macaulay's poem).

AUTUMN STORIES. The story of Ruth (from the Bible); *The First Thanksgiving;* the story of Arachne (Greek myth); *Baucis and Philemon* (Greek myth); *The Discontented Stone-Cutter* (Japanese legend).

WINTER STORIES. Parts of Dickens' *Christmas Carol; The Happy Prince* (Oscar Wilde); the Christmas story (from the Bible); *The Birds' Christmas Carol* (Riggs); *How the Fir Tree Became the Christmas Tree.*

Related Subjects. The following articles in these volumes will be helpful in connection with this article on story-telling:

Aladdin	Fiction
Ali Baba	Games and Plays
Alice's Adventures in Wonderland	Hiawatha
Arabian Nights	Language
Bible, subhead *The Bible for Children*	Legend
Bluebeard	Literature, subtitles *Literature for Children* and *Graded Lists for Study*
Cinderella	Mother Goose
Drama, subtitle *Shakespearean Drama in Schools*	Mythology
Fable	Novel
Fairies	Rip Van Winkle
	Robinson Crusoe

STOSS, *shtohs,* VEIT (about 1440-1533), one of the greatest masters of wood carving Germany has ever produced, and a famous sculptor. Many of the statements given about his life are a matter of doubt, but it is believed that he was born and educated at Nuremberg; it is known that he practiced his profession alternately in that city and in Cracow. Most of his creations are religious in character, and they show a depth of spiritual understanding rare among artists of his time. Stoss's works may be seen in cathedrals and public buildings in various parts of Germany. Among the most notable of his wood carvings are the high altar in the Church of Saint Mary's, Cracow, and *The Angel's Salutation* in the Nuremberg Church of Saint Lawrence. His sculptured stone figures include the red marble *Monument of King Casimir IV* and three reliefs entitled *Last Supper, Christ on the Mount of Olives* and *Taking of Christ.* The Nuremberg Germanic Museum possesses his famous relief *Coronation of the Blessed Virgin* and several other examples of his art.

STOVE, an enclosure of metal, brick or earthenware, in which fires are built for heating houses or for cooking. The modern stove heater, an outgrowth of the cast-iron box stove invented by Benjamin Franklin in 1744, is constructed of circular steel plates with draughts and dampers for regulating the heat. Although it adds greatly to the dust content of the air and absorbs the moisture of a room, it warms a house splendidly, giving out from forty to sixty per cent of the heating value of the fuel, which is usually coal, while fireplaces do not utilize more than ten or fifteen per cent. The heater is the principal device for warming farm buildings, but in modern city structures heating is generally accomplished by hot-air furnaces, steam heat or hot-water heat. See HEATING AND VENTILATION.

While the heater has only one chamber, where the fire burns on a barred grate, the cookstove has one or two ovens for baking, and the top of the stove is flat, with several holes over the fire for pots. Since gas and electricity have come into use, iron cookstoves have gradually given way to gas and electric stoves, as the latter are cleaner and they render work less arduous. Oil and alcohol are also used to heat small, portable stoves for cooking purposes in summer camps, and oil and gasoline stoves are common in kitchens in communities where more modern innovations are lacking.

STOWE, *sto,* HARRIET ELIZABETH BEECHER (1811-1896), an American novelist, remembered chiefly as the author of *Uncle Tom's Cabin.* She was the sister of Henry Ward Beecher, and was born and educated at Litchfield, Conn. Her family moved first to Boston and then to Cincinnati, where her father was made president of the newly established Lane Theological Seminary; and in 1836 Harriet was married to Professor Calvin E. Stowe of that institution. The Ohio River was the dividing line between free and slave soil, and she must have seen many slaves escaping to freedom, perhaps at times even aiding in their escape. She visited homes in Kentucky, also, where she witnessed some of the scenes described in *Uncle Tom's Cabin.* In 1850 Professor Stowe and his wife moved to Brunswick, Me., and later to Andover, Mass. After her husband's death in 1886 Mrs. Stowe lived quietly in Hartford, Conn.

Mrs. Stowe, because of her famous novel published in 1852, is one of the small body of writers whose productions are so completely a part of the political development of the United States as to make it difficult to judge her work

as literature. Her masterpiece was written from an impulse to show the Northern states the real nature of slavery, and it is naturally strongly partisan. It does not fail, however, to reveal the pleasant side of the slave life. Since it was written under pressure in order to keep up with its publication as a serial, it has the faults which belong to all hasty work, but it is, nevertheless, a great book because of its strong and clear pictures. That it is remarkably dramatic in its nature is shown by the great popularity it still has in parts of the country as a play. *Uncle Tom's Cabin* has been translated into at least twenty-three languages, and it is not too much to say that it has not only had a wider sale than any other work by an American novelist, but has been farther-reaching in its effects than any other piece of fiction ever written.

Of Mrs. Stowe's other works, the best are *The Minister's Wooing* and *Oldtown Folks*, really charming sketches of New England life. *Dred* is a novel of slave life which never became very popular, and *A Dog's Mission* and *Little Pussy Willow* are stories for children.

Consult L. B. Stowe's *Harriet Beecher Stowe: The Story of Her Life.*

STRA'BO (about 64 B.C.-about A.D. 19), a celebrated Greek geographer and historian. He was born at Amasia, in Pontus, removed to Rome when he was about thirty-five years of age, and made that city his home for most of the rest of his life. He traveled extensively, however, in Arabia and through Southern Europe and Northern Africa. It was on these journeys, supplemented by the works of earlier writers on geography, that his great *Geography* was based. The seventeen books of this work are extant, the first two dealing with physical geography, the next eight with Europe, six with Asia, and one with Africa. This is the most important work on geography which has come down from ancient times, in that it attempted to gather together all the knowledge of the science attainable. Strabo also wrote a history in forty-three books in continuation of the work of Polybius, but this has been lost.

STRACHAN, *strawn,* JOHN (1778-1867), a Canadian churchman and educator, first Anglican bishop of Toronto, first president of the University of King's College (now the University of Toronto), founder of Trinity University, and member of the "Family Compact." Bishop Strachan was the most conspicuous figure in the Church of his day. He was at the same time a skilful statesman, and, more than any of his contemporaries, he directed the policy of the ruling group.

Bishop Strachan was born at Aberdeen, Scotland. He attended the grammar school there and was graduated from King's College, Cambridge, in 1796. Three years later he emigrated to Canada, where he opened a boys' school at Kingston. There, and later at Cornwall, and at Toronto, the school flourished and eventually became the most famous of its kind in Canada. Under his influence came many boys who were afterwards powerful in Canadian affairs. Two of his pupils were Robert Baldwin and Sir John Beverley Robinson.

JOHN STRACHAN

While continuing his school, Strachan entered the Anglican ministry, was ordained deacon in 1803 and priest in 1804, and for eight years was curate at Cornwall. He removed to Toronto in 1812, became archdeacon in 1827 and first bishop of Toronto in 1839. During the War of 1812 he was active in public affairs, and in 1815 was rewarded by an appointment to the Executive Council. For nearly forty years thereafter his activities were almost as much political as ecclesiastical. His political activities, to be sure, concerned themselves, for the most part, with religious or educational matters. Strachan opposed the division of the Clergy Reserves, but his special aim was to secure church control of higher education. To this end he founded the University of King's College in 1843. When King's College was reorganized as a provincial institution free of religious tests and given a new name as the University of Toronto, Bishop Strachan founded Trinity University in 1852. Even though he founded this second institution, he seems to have realized that the Anglican Church could not have a legalized preference in education, and in the closing years of his life he restricted his activities to his ecclesiastical duties. Ambitious, shrewd, forceful, able, Bishop Strachan was one of the strong men of his day.

STRADIVARIUS, *stradi va'ri us,* ANTONIO (1644-1737), one of the greatest violin makers of all time. He was born at Cremona, Italy, and early entered the employ of Nicola Amati, a celebrated Cremonese master of violin mak-

ing. Not until 1690 did he free himself from the traditions of the Amati school and begin to exhibit a style of his own. From 1700 to 1715 his instruments reached the height of perfection, not only in brilliance of tone and power, but in the excellence of form and wonderful precision with which the minutest detail was executed. He seldom afterward deviated from his standard pattern. The Stradivarii of his later period were made merely under his direction, and they therefore never again reached the standard of perfection of the master's own products, which brought fabulous prices.

At the time of his death many unfinished instruments were found in his workshop. These were completed either by his sons or his pupils, but bore his name on the printed labels. Unsuspecting purchasers have been deceived into buying instruments having the outward appearance of his violins, but there are very few genuine specimens in existence.

STRAFFORD, *straf'erd,* THOMAS WENTWORTH, First Earl of (1593-1641), an English statesman, the signing of whose death warrant was one of the greatest blots on the character of Charles I. He was born in London, of an ancient family, educated at Saint John's College, Cambridge, and in 1614 and 1621 was elected to Parliament.

Opposed the King's Policies. In the second Parliament of which he was a member, he stood strongly for the rights of that body, and this spirit of resistance to the aggressions of the king characterized him also in the first Parliament of Charles I. He did not, however, sympathize with the Puritans nor share their intense hostility toward the Crown. In 1627 he was imprisoned for a short time for refusing to pay ship money, a tax the king levied upon persons and communities for his national defense, and in 1628 was one of the advocates of the Petition of Right.

Became Follower of the King. Feeling that he could not follow Parliament further in its demands, he accepted from the king, in 1628, the presidentship of the Council of the North, and was created Baron Wentworth and later, Viscount Wentworth. In his dealing with affairs in the north he showed himself very zealous to restore order and gradually he identified himself more and more thoroughly with the king and became less and less in sympathy with Parliament. In 1633 he went to Ireland as lord deputy, and there introduced his famous system of "thorough," as he called it, which conferred unquestioned benefit on Ireland, but was administered by methods so harsh that Wentworth came to be cordially hated in the island.

Returning to England in 1639, he was created Earl of Strafford and consulted by the king on all important questions. The Presbyterians of Scotland had become troublesome, and Strafford advised the king to make use of Irish troops against them, and to assert his royal prerogative in every possible way. When the Long Parliament met in November, 1640, it at once determined to impeach Strafford for his administration of Ireland, and the king summoned him to London, promising that he "should not suffer in his person, honour or fortune." Parliament dropped the impeachment, for which there was insufficient evidence, and in May, 1641, passed a bill of attainder, action being hurried by the discovery of a plot of the king's to rescue Strafford by force. The unfortunate statesman released Charles from his promise, and the king signed the bill on May 10. Two days later Strafford was executed.

Sought His Country's Good. It was long the fashion to sneer at Strafford as a turncoat and traitor, but a careful study of his life shows that he was in all things true to his convictions and acted for what he conscientiously believed to be the good of his country. A.MC C.

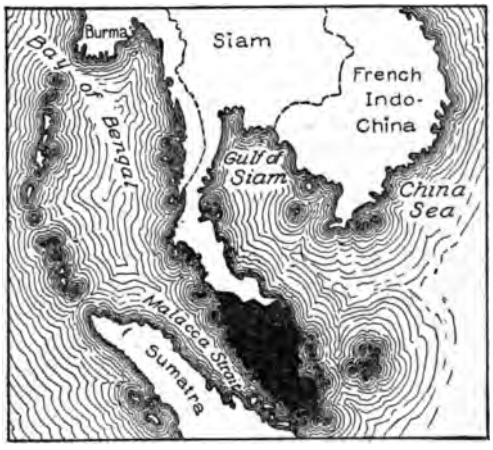
The events with which Strafford was connected led to the COMMONWEALTH OF ENGLAND, which see. Consult Forster's *Strafford,* in Statesmen of the Commonwealth Series; Browning's *Strafford.*

STRAITS SETTLEMENTS, the British possessions on and adjacent to the southwestern part of the Malay Peninsula other than the Federated Malay States (see map of Asia, opposite page 417). They are so called from the straits (Malacca) that separate the peninsula from Sumatra. The colony includes the three settlements of Singapore, Penang and Malacca. It has a total area of about 1,600 square miles and a population estimated in 1914 to be 761,521. There are about 8,000 whites; the Asiatic inhabitants are chiefly Chinese, Malays and natives of India.

Singapore is an island less than a mile from the southern extremity of the peninsula. In the Singapore settlement are included also the Cocos Islands, a small group of coral islands 1,200 miles southwest of Singapore; and Christmas Island, 700 miles east of the Cocos group.

Penang settlement consists of the island of Penang, off the west coast of the peninsula, a

strip of land opposite the mainland (Province Wellesley), and the Dindings, consisting of the small island of Pangkor off the west coast and a corresponding strip of mainland territory. Malacca is situated on the western



THE STRAITS SETTLEMENTS
(In Black.)

coast of the peninsula between Penang and Singapore. (Singapore, Penang and Malacca are described in these volumes under their respective titles.) Singapore, on the island of that name, and Georgetown, on Penang, are the chief ports, and from them are shipped vast quantities of tin, spices, rubber, gum, rattan, coffee and other tropical products. The capital of the Straits Settlements is Singapore. The colony has been under the administration of the British Colonial Office since 1867.

STRAMO'NIUM, a poisonous, ill-smelling weed of the nightshade family, whose seeds and leaves have medicinal value. Other names for it are *Jimson weed, devil's trumpet, stinkweed* and *thorn apple.* It abounds in fields and waste spots, the forked yellow-green stems often reaching a height of five feet. It bears heavily-scented, white, trumpet-shaped flowers, and smooth, green, sharp-pointed leaves, from three to eight inches long. Prickly, burlike pods contain tiny, wrinkled, black seeds, which, like the leaves, are used in making the drug called stramonium. This drug is similar to belladonna (which see) in properties and is used principally for the relief of asthma. The plant is widely distributed throughout the warmer parts of the world. Children should be cautioned not to put its poisonous seeds, leaves or flowers in their mouths.

STRASSBURG, *shtrahs'boorK,* a university city of Germany, whose fortifications, vastly strengthened since the city's annexation to Germany in 1871, are among the most powerful in the world. Strassburg is the capital of the present German Imperial territory of Alsace-Lorraine, and it is situated on the Ill River, 300 miles east of Paris and 370 miles southwest of Berlin. Its most celebrated building is the cathedral, or minster, from the tower of which a splendid view of the city and its environs may be obtained. This church, famous for its clock (see subhead below), was begun in the eleventh century but was not completed until the fifteenth century. It is one of the finest specimens of Gothic architecture in existence. The university, founded in 1621, was formerly noted for its branches of medicine and philology; in 1872 it was reorganized as a German institution and greatly enlarged. Its library, destroyed by bombardment in 1870, during the Franco-German War, has been replaced by a new collection which now numbers over 1,000,000 volumes.

In the older parts of Strassburg are many fine examples of medieval houses and other buildings adorned with beautiful carvings. The public park, called the Orangerie, is famous for its orange and palm houses. Strassburg is connected by canals with the Rhine, and its situation near the borders of France, Germany and Switzerland gives it many commercial advantages as well as great strategic importance. Among its leading manufactures are tobacco, musical instruments, machinery, leather and fancy articles.

Strassburg was colonized by the Romans, who called it *Argentoratum.* In the sixth century its name was changed to *Stratisburgum,* and it became a free town of the old German Empire in the thirteenth century. In 1861 the city was united with France, but at the close of the Franco-German War, with all of Alsace-Lorraine, it again was annexed to Germany. During the War of the Nations the city was bombarded by allied airships. Population in 1910, 178,891.

Strassburg Clock. This famous astronomical clock is thirty feet high and fifteen feet wide at its base. The large globe of the heavens at the bottom shows the course of the stars. Behind it is a perpetual calendar indicating the day of the month and all religious festivals. Above are many automaton figures, one of which is drawn across the platform each day; figures representing infancy, youth, old age and death strike the quarter hours in turn. Above the dial is a complete planetarium surmounted

by a globe which shows the phases of the moon. Every noon twelve apostles come forth and pass in procession before a figure of Christ, which tops the clock, while a cock crows at stated intervals. About this time each day a crowd is always seen near the cathedral, for the people never tire of listening to the crowing cock or of watching the procession of the apostles. The mechanism of this clock was constructed in 1839-1842; the device replaced another equally famous clock made in the sixteenth century. There was still another and earlier clock, which was set up in 1352. R.D.M.

THE CLOCK

STRATEGY, *strat'e ji,* the art or science of so leading an army that it may go into battle under the most favorable conditions. The word is derived from the Greek *strategos,* meaning literally, *the art of the leader or general.* Strategy may be exercised in defensive or offensive operations, but strategy, if defensive, can only avoid defeat, while offensive actions, although open to defeat, have victory as a definite possibility and incentive. Strategy can perhaps be somewhat simply defined as the art of properly employing an army as a whole; while *tactics* is the science that directs the movements of the subdivisions of the army.

Time is of the utmost importance in modern warfare, and the nation that has most carefully prepared for war beforehand will have achieved practical strategic results by being able to strike the first blow, the moral effect of which is always great. The first blow having been delivered, it is perhaps invariably a mistake to alter a previously-arranged plan of campaign until such alteration is literally compelled by the action of the enemy. The homely saying, "It's ill to change horses while crossing a stream," aptly illustrates the undesirability of alteration of plans.

In modern warfare in which each belligerent will try decisively to beat the opponent as quickly as possible, strategy will be most strongly exerted towards achieving a combination which will enable an overwhelming blow to be struck at the enemy's strongest point. One of the axioms of strategy is that an army can never be too strong to deliver a decisive blow, while it may readily find itself too weak to do so. Positions referred to as of strategic value possess that value to the holder only in that by holding them he is enabled to do or prevent the enemy from doing what he may seek to do. The seizing of important points and recognition of their full value, utilizing every possible advantage to the utmost, and taking from the enemy such advantages are the chief points of strategy. See TACTICS. F. ST.A.

Consult Altham's *The Principles of War;* Aston's *Sea, Land and Air Strategy.*

STRAT'FORD, a city in Ontario, the county town of Perth County. It lies on the Avon River, and is a divisional point on the Grand Trunk Railway, which maintains repair shops there. By rail Stratford is eighty-eight miles west of Toronto and eighty-one miles east of Sarnia. Shoes, woolens and chemicals are made here. The city has the county buildings, a collegiate institute and a provincial normal school. Population in 1911, 12,946; in 1916, estimated, 15,000.

STRATFORD-ON-AVON, a town in England visited by tourists from all over the world. As the birthplace of England's greatest poet—William Shakespeare—Stratford commands an interest out of all proportion to its size and importance. It is situated in the lovely valley of the River Avon, eight miles southwest of Warwick. The greater portion of the town lies on the west bank of the river, and the place is typically English, with pleasant streets, shade trees and old-fashioned houses.

The house in which the poet was born (see illustration in the article SHAKESPEARE) is preserved as a memorial and is open to visitors. Another interesting spot is the chancel of Holy Trinity Church, containing the graves of Shakespeare and his wife, Anne Hathaway. On the slab above the poet's grave the pilgrim may still read the curious rhymed epitaph beginning—

> Good frend, for Jesus sake forbeare
> To digg the dust encloased heare.

A drawing of this epitaph is shown in the article SHAKESPEARE. The Shakespeare Memorial, built on the river bank above the church,

is a pretentious building with a theater, a picture gallery and a library containing valuable books and manuscripts relating to the poet. In the memorial theater the F. R. Benson Company gave a series of performances in 1916, in commemoration of the tercentenary of Shakespeare's death. American tourists, over seven thousand of whom visit Stratford every year, contributed funds for the erection of a memorial fountain and a clock tower. At Shottery, a mile west of Stratford, is the quaint thatched cottage where Anne Hathaway lived, while the cottage of Mary Arden, mother of the poet, may be seen at Wilmcote.

Stratford is a market town and municipal borough. It is one of the oldest places in England, dating, probably, from the Roman era. In 1911 it had a population of 8,531.

Consult Lee's *Stratford-on-Avon*; Savage's *The Registers of Stratford-on-Avon.*

STRATHCONA AND MOUNT ROYAL, DONALD ALEXANDER SMITH, First Baron, (1820-1914), a Canadian fur trader, railway builder, financier and statesman, whose career is so closely interwoven with Canadian history that he defies classification and stands forth unique among Canadians of all time. His youth and middle life were devoted to the service of the Hudson's Bay Company and the upbuilding of the Northwest. He was fifty years old when he held his first political office. At sixty he became the chief promoter of the Canadian Pacific Railway, and for nearly a decade devoted himself to the task of financing this great organization. At seventy-six, an age when the average man is ready for the grave, he accepted the office of Canadian High Commissioner to Great Britain, and for nearly a decade more served his country with energy and ability.

In the years immediately preceding his death Lord Strathcona was a commanding figure wherever he appeared. His great age, his venerable dignity, his high reputation, combined with his vast wealth and his personal and official rank, set him apart from other men. Great as the offices were which Strathcona held, yet he always magnified them through his own greatness. Never did any office or power overshadow the man.

With the Hudson's Bay Company. Donald Smith was born at Forres, Morayshire, Scotland, but in 1838 left Scotland for Canada as a junior clerk in the service of the Hudson's Bay Company. For thirteen years he was stationed in Labrador. There, besides mastering the details of the fur trade, he gave much of his time to attempts at introducing improvements into the conditions of life. For example, he was the first to prove that potatoes could be grown there with success. Leaving Labrador in 1851, he spent the next decade in the Northwest, where he became in turn chief trader and chief factor. Ultimately he became chief commissioner of the company's fur trade, with headquarters at Montreal.

In 1874 he retired from active participation in the fur trade, exchanging the commissionership of that branch for the place of land commissioner. Thereafter the scope of his work and influence widened. He became the champion of the active traders, the "wintering partners," in their efforts to get fair treatment from the board of directors, and was himself elected to the board in 1883. Sir Donald (he was knighted in 1886) was already foremost in influence among all those connected with the company and in 1889 was formally elected governor, thus becoming in title, as in fact, the chief executive. Thus Donald Alexander Smith sat in the place once occupied by Prince Rupert, by King James II of England, and the great Marlborough.

LORD STRATHCONA

The Northwest and Politics. While thus rising in the councils of the Hudson's Bay Company, Donald Smith widened his field of activities. By virtue of his character, as well as his official position, he had a remarkable hold over the traders, the Indians and the half-breeds of the West. He had traversed the West in summer and winter, was familiar with its resources in men and materials, and was known to all. During the disorders in the Red River valley in 1869 and 1870 he acted as special agent for the Dominion government, and but for his courage and tact the uprising would have been far more serious than it was.

In 1870, on the organization of Manitoba as a province, Smith was elected to the Manitoba assembly as a Conservative, and in the same year was appointed to the Council of the Northwest Territories, and was elected for Selkirk (Man.) to the House of Commons. He resigned his seat in the assembly in 1874, as a

result of the prohibition of dual representation, but remained in Parliament until 1880. He again sat in the House of Commons as member for Montreal West (he had in the meantime moved from Winnipeg to Montreal) from 1887 to 1896.

The "C. P. R." The interval between these two periods of service in the Dominion Parliament, Smith devoted to the Canadian Pacific Railway, which owed its successful completion no less to his vision of the future and his ability as a financier than to the executive capacity of Sir George Stephen and the assistance of Sir John A. Macdonald. Stephen (later to be Baron Mount Stephen) and Smith already had experience with railways, for, together with James J. Hill, they acquired control of a bankrupt road in Minnesota out of which has grown the Great Northern Railway. When the time came to award the contract for the construction of a transcontinental railway, Smith's name did not appear in the list of members of the syndicate because of a recent political quarrel between him and Sir John Macdonald. But it was not long before Smith was recognized as one of the chief factors in the company, and when the line was actually completed it was Smith who drove the golden spike which marked the end of the work. This was on November 7, 1885, and on June 28, 1886, the first through train left Montreal for the Pacific. For his share in the work, Smith was rewarded with the nomination as Knight Commander of the Order of Saint Michael and Saint George.

High Commissioner in London. During his second term of service in the House of Commons, from 1887 to 1896, Sir Donald (as he then was) was a conspicuous member, although he seldom addressed the House. Near the end of the period, when the Conservative party was falling to pieces, there were suggestions that he should assume the leadership of the party, and many believed that no other leader could save it from defeat. Sir Donald labored hard to effect some sort of unity, and to compromise the Manitoba school question, but he declined the leadership. Sir Charles Tupper was therefore called home to lead the Conservatives, and Sir Donald Smith was sent to London in his place as High Commissioner. He was raised to the peerage in 1897 as Baron Strathcona and Mount Royal.

Although an old man, he was extraordinarily active, appeared frequently in public and on state occasions, and became in England, as he had been in Canada, one of the most familiar figures in the public eye. The ambassador of the United States to Great Britain is an officer who has many responsibilities and many obligations. Yet one holder of this office, Whitelaw Reid, spoke of Lord Strathcona as follows:

> I sometimes think that my office is magnified by your kindness into a greater than it would be otherwise, and my duties, more numerous here from the same cause, would sometimes overwhelm me if my spirit of emulation were not aroused by the constant spectacle of a rival. He, too, is an Ambassador of an English-speaking Transatlantic country, in extent equaling my own and advancing by rapid strides to wealth and importance second only to ourselves in the whole Western world. Wherever I go there is he, and to a great many functions I do not go, he does. Yet, great as is the country he represents, the Ambassador of the Dominion magnifies his office. Beside his indefatigable exertions, my own office is a sinecure.

His Varied Activities. Not only did Lord Strathcona labor in many fields at various times, but even at the same time. While he sat in Parliament, beginning in 1887, he was president of the Bank of Montreal, and he continued to hold this office even after he became High Commissioner. He was also a director or officer of many other financial and industrial organizations. He took a keen interest in educational problems, and was one of the first to advocate technical training along the lines afterward adopted by Sir William C. Macdonald. He was elected chancellor of McGill University in 1889, and lord rector of Aberdeen University in 1899. In 1900 he presented to the British government the famous troop of the "Strathcona Horse," a cavalry troop raised and equipped at his expense for service in the South African War.

Lord Strathcona's interest in education and in the welfare of people less fortunately situated than he took many practical turns. He gave $1,000,000 as a half of the endowment fund for the Victoria Hospital at Montreal, and later added another million. Royal Victoria College for Women, at Montreal, also received $1,000,000 from him, McGill University received over $2,000,000, and Yale, Aberdeen and other universities received smaller amounts. His private donations to charities were countless. Old friends of pioneer days were never forgotten when they fell upon evil days, and many who had no claim on him knew the greatness of his generosity. Sir Wilfred Grenfell, the famous Labrador missionary, tells that he found Lord Strathcona one Christmas morn-

ing personally reading and sorting a stack of several letters containing appeals for help. Dr. Grenfell also tells the following story, characteristic of Lord Strathcona's many private benefactions:

On one occasion Lord Strathcona was asking me about old Labrador acquaintances, and as it was then fifty years since he had left the coast, it might have been expected that, with all his multiplicity of interests, he would long before have forgotten the individuals. He happened to ask after a certain woman who had been his servant so many years before. I told him that she had long ago passed away, but that her daughter, who was married and had a very large family, had often spoken of her mother's connection with him. He asked how she was faring with so many children, but appeared to take very little notice when I told him that the family were having hard times. However, the next time I visited that part of Labrador I heard that he had sent a special Labrador order of pork, flour, molasses, butter, and many outfits of clothing for herself and the children. To this day the woman is wondering "where on earth that winter's diet and all that clothing could have come from."

No sketch, however brief, could do justice to Lord Strathcona without special reference to his wife. During their married life of more than sixty years their devotion to each other was exceptional, and the frequent separations which were necessary because of Lord Strathcona's many interests never lost their sadness for them both. In 1913, only a few months before her death, she was at Glencoe, their Scotch estate, while Lord Strathcona was in London. He was then in his ninety-third year, but every evening he personally went to the telegraph office to send her a message. A thousand other messages he could turn over to a messenger, but this one message no one but himself was allowed to handle. She died in November, 1913, in her eighty-ninth year. Lord Strathcona survived her loss only ten weeks, his death occurring on January 21, 1914. W.F.Z.

Consult Willson's *The Life of Lord Strathcona and Mount Royal;* Preston's *Strathcona and the Making of Canada.*

STRATIFIED, ROCKS. Slate, mica, shale and sometimes limestone are formed in layers and can be split into thin pieces. These layers are called *strata,* and rocks formed in layers are *stratified* rocks. Stratified rocks have been formed by sediment, which was first mud and then became hardened into rock. As originally formed, the layers were horizontal, but by folding of the earth's crust they have, in many places, been thrown out of their former position, and are in many different positions, from the horizontal to the vertical. The angle of inclination which these layers form with the horizon is called the *angle of dip.* See DIP.

STRAUS, *strous,* OSCAR SOLOMON (1850-), an American public official who has been identified with the diplomatic service, the world peace movement and the arbitration of labor disputes, and been active in other notable lines. He is of German birth and ancestry, a native of Otterberg in Rhenish Bavaria, and is the brother of Isidor (a *Titanic* steamship victim) and Nathan Straus, both well known for their interest in humanity. Oscar Straus was brought to America when he was four years old. He was graduated at Columbia University and Columbia Law School and later engaged in the department-store business in New York. From 1887 to 1889 he represented the United States in Turkey, and was again minister to that country under President McKinley, from 1897 to 1900.

In 1902 Straus succeeded Benjamin Harrison as a member of the Permanent Court of Arbitration at The Hague. President Roosevelt appointed him Secretary of Commerce and Labor in 1906, and in 1909-1910 he served as ambassador to Turkey. In New York state he has taken an active interest in various fields of public work. An ardent supporter of progressive principles, he joined the Progressive party in 1912 and made an unsuccessful campaign for the governorship of New York. In 1914 he was chairman of the arbitration commission that settled a wage dispute between the heads of the Eastern railroads and their engineers, and the following year he became chairman of the New York State Public Service Commission (first district). He is the author of several books, including *The Origin of the Republican Form of Government in the United States, Reform in the Consular Service, The Development of Religious Liberty in the United States* and *The American Spirit.*

STRAUSS, *strous,* DAVID FRIEDRICH (1808-1874), a German theologian and writer, born at Ludwigsburg, near Stuttgart. While at the University of Tübingen he came under the influence of the philosophy of Schilling, Schleiermacher and Hegel.

In 1830 he became assistant pastor in a country congregation, and soon was made professor of history, Latin and Hebrew in a seminary at Maulbronn. The following year he went to Berlin, with plans to study under Hegel and Schleiermacher. The former died just after he arrived, but Strauss was a faithful attendant

at the lectures of the latter for a short period of time, then returned to lecture at Tübingen, where his attacks on Christianity aroused wide comment. In 1835 appeared his most famous work, *Das Leben Jesu* (Life of Christ), in which he presented his theories of the origins of Christianity and explained the Gospel history on mythical grounds. Later publications provoked such a storm of protest that his appointment to a position in the University of Zurich was recalled.

He married Agnes Schebest, an opera singer, in 1841, but the two separated after five years. In 1848 Strauss was made a member of the Württemberg Chamber, and being a conservative in politics soon resigned. From that time he lived a wandering life, writing critical biographies and theological treatises in which he revealed his complete abandonment of the principles of Christianity for those of modern science. His biographical writings include *Schubart, Märklin, Ulrich von Hutten* and *Voltaire.*

STRAUSS, JOHANN (1825-1899), an Austrian composer, was born at Vienna. His father, Johann Strauss, was a well-known composer, the first to elevate dance music, especially the waltz, to an artistic plane, but he was bitterly opposed to his son becoming a musician. The boy's mother, however, paid for his instruction on the violin; when he was nineteen years of age he left home to conduct a restaurant orchestra at Hietzing, Austria. There he began to present his own compositions, mainly waltzes, and the restaurant soon became crowded with admiring listeners. In 1849, after his father's death, he united his own orchestra with that of his father and began a series of tours of Europe. Everywhere he appeared he received great praise for the grace and beauty of his original dance music.

In 1855 he became conductor of summer concerts in Saint Petersburg (now Petrograd) and from 1863 to 1870 was conductor of the Russian Court balls. His last days were spent at Vienna, where he died on June 3, 1899. His five hundred dance compositions have won him the title of the Waltz King. Among the most noted are *Beautiful Blue Danube, Artist's Life, One Thousand and One Nights* and *Wine, Women and Song.* He composed also several successful operettas, among them *Indigo, A Night in Venice* and *Prince Methusalem.*

STRAUSS, RICHARD (1864-), a German composer, was born at Munich. His father, Franz Strauss, was one of the greatest horn players of Germany, and Richard Strauss as a small boy showed marvelous musical talent. He was a good pianist at the age of four, a composer of music worthy of publication at six and an advanced student of musical theory and composition at ten. Before he was sixteen years old his songs were becoming well known and his *Symphony in D Minor* was being played by several eminent pianists. Even Bülow, who was a merciless critic, praised his work and had his *Serenade* performed at Meiningen, Germany. In his early manhood Strauss gained further notice by his numerous compositions for voice and piano, but he had not yet found his true sphere and showed too greatly the influence of other composers.

Bülow awakened his genius by pointing out the tendency of modern music away from mere beauty of melody and harmony to realism and absolute truthfulness. About 1885 Strauss began to profit by this suggestion and commenced to produce the unique and often highly realistic compositions for which he is now noted. In that year he became a conductor in the Munich opera and in 1889 received the position of chief conductor at Weimar, Germany. He returned to Munich in 1894 as chief conductor, and in 1899 accepted a similar position in Berlin. Storm after storm of criticism, ridicule and abuse followed the appearance of new works by Strauss, for apparently he broke with the traditions of music. In such a work as *Till Eulenspiegel* he introduced the spirit of humor to such an extent as to make some portions a source of hearty laughter, and this naturally has shocked the musical sentimentalist. In *Don Quixote* he became so realistic in his descriptions that some romantic lovers of music could discover very little harmony in it. His *Domestic Symphony,* describing the ordinary sounds and scenes in the kitchen and dooryard of a home, aroused international discussions.

Strauss has not hesitated to use music for satirical purposes, and his opera *Feuersnot,* an amusing yet biting satire on musical and social conditions in Munich, is a conspicuous example of his success in such efforts. His greatest operas, however, are *Elektra* and *Salome,* works of exceptional beauty and brilliance, but so realistic as to repel many of the more old-fashioned lovers of music. His songs, however, are often full of delicate sentiment and exquisite charm. No man in musical history has been more discussed, for he undoubtedly has greatly broadened the scope and subjects of composition and has shown originality. R.D.M.

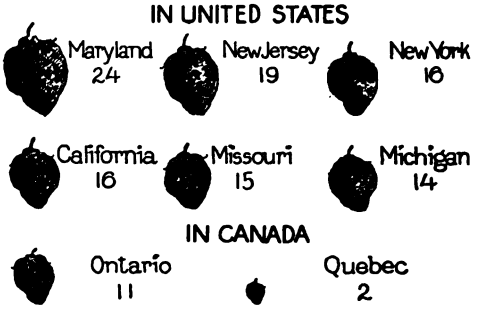
Consult Huneker's *Mezzotints in Modern Music;* Newman's *Richard Strauss.*

STRAW, which consists of the dried stems of oats, wheat, rye, barley and other grains, has a wide range of usefulness. In the manufacture of paper, baskets, saddles, bottle covers, strawboard, suit cases and hats it figures importantly, but hat making is undoubtedly the greatest straw industry. In America it is carried on chiefly in Massachusetts. Foreign centers are in China, Germany, Austria, France, Switzerland and Italy; in Bohemia and Saxony there are probably between 20,000 and 30,000 persons engaged in making straw hats. The most exquisite work is done in Tuscany, where leghorn braids are made from a special kind of straw.

Wheat is the most desirable grain for hat straw. The stems are pulled up, as mowing would injure them. When cut in proper lengths they are bleached in the sun, stripped of the outer layer, bleached again with sulphur and sorted with regard to size and color. Even though looms have been invented for straw-weaving, much of the work is still done by hand. Straw is also used as filling for packing cases, food and bedding for farm animals, and an ingredient of fertilizer. Panama hats are not made of straw, but from the leaf fiber of a species of palm.

STRAWBERRY, *straw'ber i,* a luscious red fruit, grown on a plant which is one of the most popular members of the rose family. The plant is a trailing vine whose leaves are borne in clusters of three. One can easily understand why Macaulay exclaimed, on his return from India, that he would gladly trade all the fruits of the Orient for a single basket of strawberries. Just as its relative, the rose, queens it over the rest of the flowers, so the strawberry lords it over the other berries. The domain over which it reigns in America, where it is more extensively cultivated than any other small fruit, stretches from Mexico to Alaska, from New England to the Pacific coast. It is at home in every province of Canada, in Europe, in South America; and wherever it grows it is a favorite

THE STRAWBERRY
Plant: blossom, leaves and fruit.



THE STRAWBERRIES OF A YEAR
The figures represent the yield in average years in the leading American states and Canadian provinces.

on account of its delicious flavor, delicate aroma and rich beauty.

As a matter of fact, the strawberry is not a berry in the technical sense, for it lacks the outer skin enclosing seeds and pulp that distinguishes true berries, like currants and huckleberries. It is a fleshy, swollen seed receptacle bearing the dry, yellow seeds upon its pitted outer surface; the star-shaped hull that is removed before the berry is eaten was early in the season the calyx of the blossom. Not every blossom will produce fruit, for some lack stamens and need to be grown in the neighborhood of staminate plants, so their seeds may be fertilized by the pollen. See CROSS-FERTILIZATION.

Cultivation. It is the youngest plants that give the best quality and quantity of fruit, and some growers permit their vines to bear but once or twice. Young plants should always be used in "setting" a bed. Both spring and fall planting are practiced, but if the climate is severe fall planting necessitates a great deal of attention in the way of covering the bed. Very large and fine fruits are obtained by planting in hills and cutting off the runners, but usually strawberries are set in rows and the runners allowed to mat. In the row the plants are from fifteen to eighteen inches apart, while the rows themselves have three or four feet between them, to allow room for cultivation.

Any good garden soil is suitable for strawberry growing, but the richer the soil the larger the crop, and fertilization is usually necessary

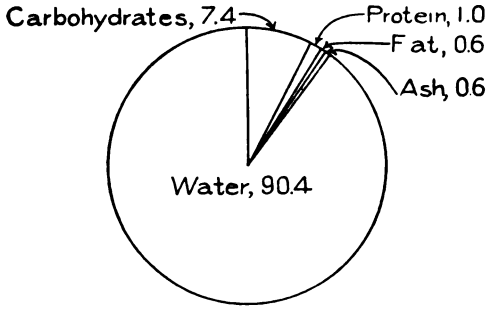
:he first heavy bearing. Rotation of crops ıerally practiced by commercial growers. uthority gives this advice:

strawberry is a cold-blooded plant, and is at its best in a very warm place. A northope is more favorable, other things being than a southern one. Land that has been within a year or two is to be avoided, on ıt of the probable presence of white grubs So also land that has been in strawberries a year is liable to contain insect enemies ıt spores. The best results cannot be sewhere water stands for weeks within a foot surface, during the growing season. People t generally aware also that large trees near wberry bed are very injurious, on account water they take from the soil.

ideal preparation is first to drain and the bed, in the fall. Then cover the sur-ith manure; and in the spring rake off all and then make fine the soil to the depth inches. . . . . If one has any doubt the fertility of land, in the spring, just be-he plants come into bloom, apply a few ed pounds of a good fertilizer per acre. ıundred pounds of nitrate of soda, when half the fruit has set, will add to the crop the luxuriance of the plant. I am satisfied ong experience that a good coat of manure d in the winter is one of the best methods a good crop of strawberries. Lime should be used on land for strawberries, nor a very amount of unleached wood ashes.

wberries require a great deal of water, hen the rainfall is insufficient some form tering must be resorted to. In a home ı bed this can be accomplished by digging every two feet in the row and pouring ɔne to two quarts of water into each hole. event evaporation, draw a little dry earth he moistened place. As sprinkling merely ɛns the top soil and causes the ground to it is not a satisfactory method of supply-ıter. Moisture can also be conserved by ual stirring of the soil, for this cultiva-ɛauses the top layer to act as a mulch revents the escape of moisture from be-Commercial growers resort to irrigation, ıich the water is distributed through the in a series of V-shaped troughs.

ıwberry Enemies. The strawberry is at-l by several insect pests and by various d diseases. Among the latter is blight, t, which forms small purple spots on the . Bordeaux mixture (see INSECTICIDES 'UNGICIDES) is a standard remedy for all d diseases. Destruction of affected plants ıe burning over of old beds are recom-ɛd as aids in fighting grub insects. The ɛerry weevil, especially troublesome in ıuthern states, is a small black beetle that preys on buds and blossoms. It may be destroyed by applications of white hellebore and kerosene emulsion. Kerosene emulsion is also



FOOD ELEMENTS IN THE STRAWBERRY

recommended for killing the strawberry leaf roller, a small, yellowish caterpillar that attacks the leaves. L.M.B.

For illustration of other members of the Rose Family, see page 5081. Consult Fletcher's *The Strawberry in North America;* Terry and Root's *A B C of Strawberry Culture.*

STRAW PLAIT, *playt,* braided or plaited straw, employed in making hats, mats and numerous small commodities. See STRAW.

STREATOR, *stre'ter,* ILL., a city in La Salle County in the north-central part of the state, ninety miles southwest of Chicago and fifty-six miles northeast of Peoria. It is on the Vermilion River and on the Chicago, Ottawa & Peoria, the Atchison, Topeka & Santa Fe, the Burlington, the Chicago & Alton, the New York Central and the Wabash railroads. There is an electric interurban line to Chicago. The area of the city exceeds three square miles. In 1910 the population was 14,253; it was 14,304 in 1916 (Federal estimate). Interesting features of Streator are a Federal building, a Carnegie Library and parks. Near by are Starved Rock and Deer Park. The surrounding country is agricultural, and near the city are valuable deposits of coal and clay. The industrial establishments include manufactories of glass, bottles, brick and tile, sewer pipe, automobile accessories, carpet sweepers, metal specialties, garters and banana crates. Streator was settled in 1860, was incorporated as a village ten years later, and became a city in 1882. T.G.E.

STRENGTH OF MATERIALS, *ma te'ri alz,* a term used to indicate the resistance offered by such materials as stone, wood and steel to stresses tending to change their shape. In the construction of buildings it is necessary to select the material which will best withstand the particular stress to be exerted upon it. Ma-

terials differ greatly in this regard. Several sorts of stress are usually distinguished. There is a *tensile,* or stretching, stress, and resistance to this direct pull is known as tensile strength. *Compressive* strength is resistance to such crushing masses as pillars support. *Shearing* strength is resistance to forces acting transversely to the material. In addition to these there is a *torsional,* or twisting, stress, but this is really a combination of the larger classes first named. Still other stresses are occasionally distinguished.

Ingenious machines have been devised for testing the strength of materials, the strain applied being that to which the material will be most subjected when in place. Materials are said to have elasticity, and this limit of elasticity is not exceeded as long as the material resumes its shape when the stress is removed. When, however, the material becomes "set," it is said to have reached the *yield point;* and in building, the stress at the yield point, rather than the breaking point, is what concerns the contractor.

Steel and wrought iron offer the stoutest resistance to pulling strains. Wood, which does not suffer a great tensile stress, has what is known as a greater elastic range than steel or iron; that is, it bends more under a given pressure. The strength of wood depends upon its weight, the heavier woods being usually also the stronger. Most materials will withstand a severer crushing than pulling strain, but this is not true of wood. Cast iron will withstand a very heavy crushing strain, and for that reason it is commonly employed in the spans of bridges and in the foundations of modern buildings. The tenacity of materials is put to a harder test under twisting strains than any other. In order to combine strength with lightness, materials are often cast in hollow form.

The strength of materials can be expressed in figures with only a rough approximation to exactness, because the strength varies with different specimens. In engineering work, actual tests determine the fitness of any material to withstand the stress to which it will be subjected. The tensile strength of such woods as white oak and chestnut is about 12,000 pounds to the square inch; that of hemlock, red oak and white pine, about 8,000 pounds. The crushing strength of white oak is about 8,000 pounds to the square inch and that of the other woods mentioned between 5,000 and 8,000 pounds. Portland cement has a tensile strength of about 700 pounds to the square inch, and ordinary structural steel has a tensile strength of from 60,000 to 70,000 pounds per square inch. The table of estimates given below was prepared by William C. Unwin, an English authority on the subject:

STRENGTH OF MATERIALS, IN POUNDS, PER SQUARE INCH

MATERIAL	TENSILE STRENGTH	CRUSHING STRENGTH	SHEARING STRENGTH
Cast iron	from 30,50	130,000	12,000
	to 10,800	50,000	8,700
Wrought iron	from 67,000	50,000	49,000
bars	to 33,500	(average)	22,400
Steel plates	from 65,000	.....	50,000
	to 110,000	.....	83,000
Steel boiler plates	66,000	.....	56,000
Rivet steel	65,000	.....	55,600
Copper, rolled plates	31,000	.....	.....
Copper, annealed wire..	45,000	.....	.....
Brass	from 17,500	.....	.....
	to 29,000	.....	.....
Cast zinc	7,500	.....	.....

Consult Merriman's *Strength of Materials;* Burr's *Elasticity and Resistance of the Materials of Engineering.*

STRIKE, the action of a body of laborers in ceasing work in order to force an employer to grant their labor demands. It has always been the chief weapon of labor organizations. When employees leave their work, not because of dissatisfaction with their own condition, but to make their employer bring pressure upon another employer whose laborers have already struck, their act is known as a *sympathetic strike.* A *general* strike, such as occurred in Italy in 1914, is a political protest participated in by all the laborers in a country. A *lockout* is the reverse of a strike; that is, it usually results from a strike and is the refusal of an employer to permit his employees to work until they have submitted to his terms.

Consult Sorel's *Reflections on Violence;* Adams and Sumner's *Labor Problems.*

Related Subjects. The reader is referred to the following articles in these volumes:

Eight-Hour Day — Open Shop
Labor Organizations — Sweatshop System

STRIND'BERG, AUGUST (1849-1912), one of the foremost Swedish writers of modern times. His literary output is difficult to classify because it represents such a variety of interests and so many schools of thought. A man of extraordinary mental energy, he was constantly stimulated by a craving to investigate new in-

ual fields. Strindberg was the son of an e tradesman of Stockholm. He studied sala University, but left that institution it taking a degree. Thereafter he taught, ed in newspaper work, tried his skill on

AUGUST STRINDBERG

ige and was vise busy. 78 he pro- his first tant play, r *Olof*, a of value e it started olt against ionored tra- s in Swedish ure. The year ap- l his novel *ed Room*, which revealed his gift for sar- expression of opinion and realistic de- on.

e started on his literary career he worked superhuman energy, and for two years 1897) was idle because of a mental break-

At various times he was a realist, a iticist, a skeptic and a mystic. He was a zealous advocate of the theory that n is inferior to man mentally, physically norally. Strindberg's numerous writings e *A Fool's Confession* (autobiographic in ter); *The Natives of Hemsö*, a novel of sh peasant life; *Fisher Folk; Utopias ed*, a plea for Socialism; *Speeches to the sh Nation*, and the plays *Gustavus Adol- The Father* and *Lucky Pehr*.

RING'ER, ARTHUR (1874-), a Cana- oet and novelist, favorably known for his erses no less than for his popular detec- ories and works of fiction. Stringer was it London, Ont., and was educated at the rsity of Toronto and at the University of l. Returning to America he engaged in y work, was an editorial writer for several and was later literary editor of *Success*, a ine. His writings are voluminous; among are *Watchers of Twilight; The Loom of ty; Lonely O'Malley; The Silver Poppy; ims; Phantom Wires; The Wire Tap- Gun Runner; Shadow*, and *Irish Poems*.

RONTIUM, *stron'shi um*, first found in ad mines of Strontian, Argyllshire, Scot- in 1781, is a pale yellow metallic element compounds occur in small quantities in soil and mineral waters. It is harder lead, is ductile and malleable, that is, capable of being drawn into a wire and hammered into a sheet, and gives a brilliant crimson flame. Strontium and barium (which see) resemble each other very closely. Strontium hydroxide is used to extract sugar from molasses in the beet-sugar industry. The nitrate is used in fireworks because it colors a flame crimson. "Red fire" is a mixture of potassium chlorate, shellac and strontium nitrate. The chemical symbol for strontium is Sr. See CHEMISTRY, subhead *Elements*.

STRYCHNINE, *strik'nin*, or *strik'neen*, a very bitter, poisonous drug with powerful stimulating properties, obtained from the seeds of the nux vomica (which see) and kindred plants. In doses one-sixtieth to one-fifteenth grain it is often prescribed as a tonic and stimulant, for it increases the flow of digestive juices, and directly affects the spinal cord, and indirectly the heart and lungs. One-eighth grain dose will kill a dog; three times as much causes spasms in man, and one grain is usually fatal. The symptoms—violent twitching, difficulty in swallowing, and convulsions, during which the body is bent backwards—appear in about twenty minutes, and death may result in two hours from suffocation or exhaustion. A stomach pump or an emetic should be used at once (see ANTIDOTE, page 282). The drug is deadly to all animals save a bird of the hornbill species which eats the seeds with impunity, and a mite that feeds on the plant. The chemical formula for strychnine is $C_{21}H_{22}N_2O_2$ (see CHEMISTRY, subhead *Elements*). C.B.B.

STUART, *stu'ert*, CHARLES EDWARD (1720-1788), called the *Young Pretender, Bonnie Prince Charlie* and the *Young Chevalier*, was the eldest son of James Edward Stuart and the grandson of the deposed James II of England. James Edward, known as the *Old Pretender*, was the son of James II by his second wife. In 1745 Charles Edward made a determined effort to win back the English throne for the Stuart family. Although he was aided by the Highland clans of Scotland and gained some successes, there was no uprising in England in his favor, and in 1746 his army was defeated at Culloden Moor. The prince escaped to France, after many thrilling adventures. His life thereafter was one of dissipation, and was spent chiefly on the Continent. He died in Rome.

STUART, GILBERT (1755-1828), an American painter of the early national period, whose portraits of Washington are the most famous of all likenesses of the first President. Stuart executed at least forty portraits of Washington,

the first in 1795. Every one is familiar with the so-called "Athenaeum" head, showing the left side of the face. A full-length picture—*Washington at Dorchester Heights*—is also well known. Both of these are in the Boston Museum of Fine Arts. The Metropolitan Museum, in New York, possesses the famous "Gibbs-Channing" portrait.

STUDIO OF GILBERT STUART
It was here, near Philadelphia, where he painted many of his Washington portraits.

Stuart was born near Newport, R. I. He began to paint when a boy of thirteen, without any guidance, and though he had begun to accept commissions before 1775, he had little opportunity to study under good masters until that year, when he went to London. Between 1778 and 1782 he lived and worked with Benjamin West, his countryman. After winning a name in London and Dublin as a fashionable portait painter, he returned to America, his chief reason for this move being his desire to secure Washington as a sitter.

Stuart painted the first Washington head in Philadelphia. Later he lived in Washington and in Boston, and he died in the latter city. While in Europe he painted George III and the future George IV, Louis XVI of France, Sir Joshua Reynolds, Benjamin West and the famous actress, Mrs. Siddons. Among other sitters were the four Presidents following Washington, also John Jay and Jerome and Madame Bonaparte. His paintings are notable for their purity and delicacy of coloring, and he succeeded in representing the personality of his subject with force and accuracy.

STUART, House of, a royal dynasty of England and Scotland, the members of which in theory and practice were exponents of the principle that "the king can do no wrong" (see Divine Right of Kings). The first Stuart to rule over England was James VI of Scotland, son of Mary Queen of Scots. In 1603, on the death of Elizabeth, last of the House of Tudor, James ascended the throne of England as James I, thus bringing the two countries under one sovereignty. His successor, Charles I, ruled so despotically that he was deposed and beheaded and a commonwealth was established (1649). In 1660 the family was restored to the throne in the person of Charles II, son of Charles I. In 1685 James II, brother of Charles, became king. He applied the divine right theory so recklessly that in 1688 he was deposed by a bloodless revolution, and the crown was bestowed on his daughter Mary and her husband, William of Orange, the two becoming joint rulers of the kingdom. In 1702 Anne, sister of Mary, succeeded to the throne. She was the last ruler of the Stuarts. In her reign Scotland and England were united. See genealogical table on next page.

Related Subjects. The following articles in these volumes deal with Stuart rulers or pretenders:

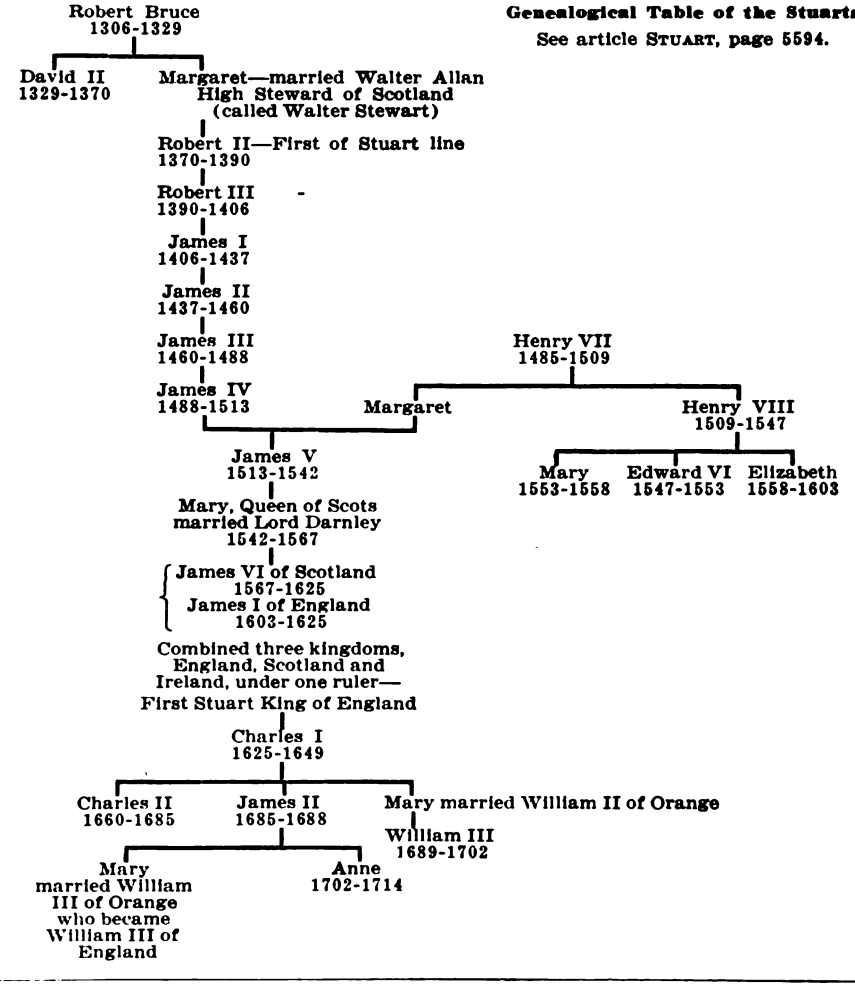
Anne	Mary, subhead *Mary II*
Charles I and II	Stuart, Charles Edward
James I and II	William III

STUART, James Ewell Brown (1833-1864), a dashing cavalry officer in the Confederate service during the War of Secession. He was born in Patrick County, Virginia, was a student in Emory and Henry College, and was graduated in 1854 at West Point Military Academy. In 1857 his regiment was sent to Kansas to enforce order, and he also saw service against the Cheyenne Indians. He resigned from the Federal army in 1861, when Virginia seceded, and was commissioned lieutenant-colonel of Virginia troops, first winning distinction at the first Battle of Bull Run. After the Battle of Fair Oaks, when Lee was preparing a vigorous attack, Stuart with 1,200 Confederate horsemen went around McClellan's army in order to learn the strength and location of the Union forces. He was commissioned major-general of cavalry in 1862, and during the Battle of Antietam made a raid into Pennsylvania. He aided Stonewall Jackson at Chancellorsville, and commanded that general's corps temporarily after Jackson's death. In the Wilderness campaign Stuart was successful in several engagements. He was mortally wounded at Yellow Tavern in 1864, in attempting to check the advance of Sheridan against Richmond.

STUCCO, *stuk'o,* a term applied to various compounds used for interior decorating and as

a surfacing for the exterior of buildings. That used for inside decorating is a fine plaster composed of gypsum and glue water or of pulverized white marble and fine sand, gypsum and water. It lends itself readily to polishing and finishing and gives beautiful effects. Imitation marble is a form of stucco. Stucco was employed quite generally by the Greeks and Romans as a decorative medium, and they often position buildings is known as *staff* (which see).

STURGEON, *stur'jun,* a group of large fish inhabiting fresh waters and seas of the north temperate zone, caught for their flesh, which is usually smoked, and for their eggs, which are used in the preparation of caviar (which see). From the bladder of the Russian sturgeon a superior quality of isinglass is obtained. These

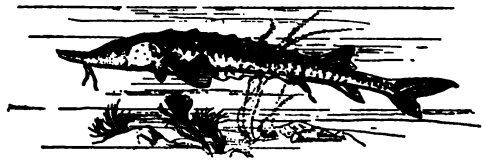


shaped it while plastic to form designs in relief. Exterior stucco is much coarser and contains a considerable amount of cement. It is now used very extensively as a surfacing material for modern houses, both for bungalows and for large and pretentious homes. It has the advantages of being durable and attractive, and it is much less expensive than stone. A cheap form of plaster used in the construction of ex-

fish have slender, elongated bodies covered with rows of bony plates. There is a long snout, beneath which is a small, toothless mouth with thick, sucking lips. The head, like the body, is well protected with plates. A single dorsal fin grows on the back, and the tail is forked, the lower lobe being usually shorter than the upper. Most of these fish migrate from salt water into streams in the spawning

season, though some species are permanent denizens of fresh waters. Their food, consisting of small marine animals and plant life, is sucked into the mouth.

One of the best-known species is the *common* sturgeon, found in European waters and along



LAKE STURGEON

the American coast from Maine to South Carolina. In the United States the supply of this sturgeon is rapidly declining because of the indiscriminate slaughter of the fish which ascend the streams at spawning time. The largest specimens are ten feet long and weigh as much as 500 pounds. Other species include the *white* sturgeon of the American Pacific coast, the largest American fish of this group; the *lake* sturgeon, a denizen of the Great Lakes and of the Mississippi Valley waters; and the great Russian *beluga,* which sometimes reaches a weight of 3,000 pounds. This fish has furnished the greater part of European caviar. Another Russian sturgeon, the small *sterlet,* is also the source of this delicacy.

STURM, *shtoorm,* JOHANNES (1507-1589), one of the most influential educators of the sixteenth century. He was born in Germany, near Cologne, studied at Leyden and Louvain, and in 1536 was put in charge of the educational system of Strassburg. This he organized so successfully that it was copied by other cities in Germany and became famous throughout Europe. For forty-three years he was director of the Strassburg Gymnasium, which was founded by him, and he achieved especial distinction by reason of his careful graduation of its course of study. As an earnest advocate of the reformed religion he insisted also that education must have a spiritual side, and he came to be looked upon as the greatest educator that the Reformed Church had produced.

STUTTGART, *shtoot'gahrt,* a city of Germany, noted for its beautiful situation and fine streets, squares and buildings. Stuttgart is the capital of the kingdom of Württemberg, and lies 115 miles northwest of Munich. It is situated at an elevation of nearly 900 feet above the sea, not far from the Neckar River, and is surrounded by verdant hills covered with vineyards and woods. About it are many attractive suburbs. A handsome avenue, the Königstrasse (King Street), intersects the city diagonally, dividing it into the upper and the lower town. Most of the buildings are stately examples of Renaissance architecture; they include the royal theater, the palace of the crown prince, the royal public library, containing over 600,000 volumes, a collection of early paintings and a museum of antiquities, the new courts of justice, the palace of William II, and one of the finest railway stations in Germany. Handsome churches, art museums and educational institutions are numerous, and the city is beautified by statues, parks and gardens.

Stuttgart is the chief center in South Germany of the printing and book-publishing industry, and its manufactures are numerous and varied. They include furniture, carriages, paper, leather, jewelry, cigars and other commodities. There is a prosperous trade in cloth, hops and horses. The city was the birthplace of the philosopher Hegel. Population in 1910, 286,218.

STUYVESANT, *sti've sant,* PETER or PETRUS (1602-1682), the last Dutch governor of colonial New York, or New Netherland, as it was then called, was born in Holland. The exact place of his birth is not known, nor are any facts about his youth and education to be obtained. It is certain that he served as a soldier in the West Indies, and at the age of forty-two was director or governor of one of the colonies founded on those islands by the Dutch West India Company. Two years later he lost a leg while leading the Dutch against the Portuguese on the island of Saint Martin, and the company as a reward made him governor of New Netherland.

He arrived at New York in May, 1647, and immediately began to make enemies by his arbitrary methods. Undoubtedly, however, he restored order and business confidence and quieted the Indians, who had been treated without mercy by the previous governor, William Kieft. In 1650 he settled with the New England colonists the northern boundaries of the Dutch colony, and further aroused the wrath of his subjects by granting too much territory to the Puritans. Five years later he captured all of New Sweden, including the present state of Delaware, and made it a part of New Netherland.

Stuyvesant was unbending, and had unbounded confidence in himself. When in 1653 a convention of Long Island citizens demanded a share in the government, he replied: "We derive our authority from God and the Com-

pany, and not from a few ignorant subjects." In 1664 an English fleet ordered the surrender of the city and, after resisting a few days, Stuyvesant yielded, on September 3. He afterwards settled down on his farm, or *bouwerij,* part of

PETER STUYVESANT
From an engraving after the painting by Van Dyck. The original is owned by Robert Van Rensselaer Stuyvesant, New York City.

which is now known as the Bowery, in New York City. He died on this estate and lies buried in Saint Mark's Church. A beautifully-carved and inscribed stone built into the wall of the church covers his grave. Irving, in his *Knickerbocker History of New York,* has given Stuyvesant lasting fame. M.T.

Consult O'Callahan's *The History of New Netherland;* Abbott's *Peter Stuyvesant.*

STYPTIC, *stip'tik,* from a Latin word meaning *to contract,* is a term applied in medical practice to an agent that arrests bleeding by drawing together the surfaces of the injured blood vessel. Tannic acid and alum are examples of chemical styptics. They act by causing coagulation or clotting of the blood; the clots close up the mouths of the injured vessels and so stop the bleeding. There are a number of vegetable styptic remedies, such as oak bark, gallnuts and turpentine. C.B.B.

STYX, *stix,* in Greek and Roman mythology, the dreary and pestilential river that flowed seven times around Hades, the abode of the dead. Across it the departed spirits were rowed by the ferryman Charon, to the realms of Pluto, who assigned them either to the Elysian Fields or to the grim regions of Tartarus. A lofty waterfall in Arcadia was also known as the Styx. Its waters were supposed to be poisonous and its barren surroundings suggested the entrance to the lower world.

SUBCONSCIOUS, *sub kon'shus,* THE. About the term *subconscious* center many important phases of mental conduct. The realm of the subconscious includes the many motives, feelings and impulses that affect behavior without reaching full consciousness; it emphasizes the significance of a variety of the mind's occupations without which human nature, normal and abnormal, cannot be understood. Consciousness has arisen because it is necessary for certain higher types of reaction. If rightly disposed it is most helpful; if wrongly applied, it becomes harmful. Consider physiological functions: We have just as much awareness as is good, and no more. We attend just enough to the sensations accompanying eating to swallow our food; if we put too much attention upon swallowing, it suffers—hence the difficulty in swallowing a pill. We walk best when we walk naturally; one does not walk naturally (which means with a right distribution of consciousness) when coming in late at church or theater with the eyes of the assembly upon one. The stiff expression so often seen in photographs reflects the consciousness of having one's picture taken.

All this illustrates the delicate relation between consciousness and conduct. Overconsciousness of one's digestion makes the nervous dyspeptic; but the complex varieties of consciousness depend upon social training. The free "unconsciousness" of childhood gives way to increasing experience. The age of self-consciousness is physiologically determined; the shyness of young men in the presence of young women is deeply regulated by all the complicated reactions of sex.

A large share of acquired habits are given over to subconscious guidance. It is common to remark that, without observing, we cannot tell how we dress, how we know where to reach for the knob of a door, to manipulate a typewriter or a sewing machine. Yet at one stage of learning all these actions were slow, deliberate and conscious. It is equally common to

observe that these mechanisms on occasion run themselves. When a man upon touching his watch in dressing for the evening begins to wind it and then to undress and go to bed, we call the lapse a case of absent-mindedness, and say that he does this un(sub)consciously. When we mislay an article and try to think how and when we disposed of it, we are trying consciously to follow the clue of our subconscious responses. Such states are characteristic in that they show a division of attention. While dominantly attentive to one action, we carry on another inattentively. In extreme absent-mindedness sensations do not yield their normal report, and actions are performed without normal awareness of their regulation. The man who carried a closed umbrella under his arm in a rainstorm, because he was convinced that he forgot the article when he left home, ignored the sensations that in a normal state of consciousness he would have received from the umbrella, and yet he maintained the contractions of the arm-muscles necessary to hold the umbrella; these also were defectively perceived.

Absent-mindedness is a state of dissociation, slight or deep; at the slightest, it gives rise to confusion due to lax attention, such as the instance of the young lady in the train who was eating a banana when the conductor collected tickets, and threw her ticket out of the window and offered the conductor the banana peel. In more severe dissociations, it approaches a dream state or a trance. It appears spontaneously in sleepwalking; the sleeper is attentive to the line of action upon which he is bent, but inattentive to all else. To awaken him means to restore him to normal consciousness. It appears still more strikingly in hypnosis (see HYPNOTISM), in which the range of consciousness can be definitely controlled by suggestion. The hypnotized subject sees, hears and feels only what is related to the action suggested; his state is abnormal in that he ignores obviously present objects if it be suggested that they have disappeared. Upon awakening he may have no recollection of anything done in the hypnotic state.

Throughout this range of observations it is to be noted that subconscious processes are at work. They are at work constantly to facilitate habits; in speaking in public we focus the attention upon the ideas we wish to express, and the subconscious mechanisms take care of the formation of the words and their utterance. Some persons talk in their sleep, so subconscious has the regulation become. Though concentrated upon one central task, we are giving fractions of attention to our surroundings, to our bodily condition, to the engagements ahead and to the routine of daily life. The relations become more interesting in the unusual cases, such as automatic writing or crystal gazing. In the latter case the subject supports and clarifies the subconscious impressions, bringing to the surface what commonly is vague and near the edge of forgetfulness. Every mind is stored with vast accumulations of impressions which cannot be consciously commanded but which none the less contribute to the imagery, the ideas, the memories, that guide thought. The crystal gazer, also the hypnotized subject, can "tap the subconscious," as it were, more fruitfully, and thus raise the impressions to a conscious value.

The subconscious plays its part in the field of sensation, in the field of memory and the organisation of knowledge, but even more strikingly in the field of action. The subconscious there becomes the sub-voluntary; or, more simply, some irregularity of action and report enters. When one finds on attempting to wind his watch that he has already wound it, or on reaching the house door at night to lock it that he has already locked it, the action and intention failed to be registered as usual. When persons are assembled about a table with their hands resting on it and solemnly maintain that no one exerted the slightest pressure, yet the table moved violently and even rose in the air, the actual contractions of their muscles are ignored. (They are ignored through the conviction—which acts as a powerful suggestion—that some outside force is responsible for the movement.)

Prejudice blinds to virtues and failings alike; it selects what it shall see; it also ignores movements and intentions. In a more subtle manner the same procedure determines mind reading (which see), which is really muscle reading. But the movements of the tables through the subconscious (ignored) contractions of the hands that rest upon it lack any intellectual expression; they proceed upon a powerful emotional interest. When, however, the hand is laid upon a small tripod and moves from letter to letter over an alphabet (ouija board) and thus spells messages in consecutive sentences (while still the sitter claims ignorance of intention or selection of movement), the performance has a more intricate meaning. For the ideas which guide the movements are also subconsciously inspired and regulated. If the instrument holds a pen-

cil and writes (planchette), the messages are more fluent, while in automatic writing the hand itself may write elaborate compositions seemingly without the full conscious direction of the writer. In all these cases the subconscious is the source of idea and expression.

Cases of this kind have always attracted attention. The most recent is that of "Patience Worth," which is a ouija board revelation. Poems, prose narratives, dialogues of an elaborate character with distinct literary merit and a quaint phraseology are recorded, and fill a volume of subconscious automatic production. The writer is unaware of the source of the ideas which are "incubated" and reach expression in this roundabout manner. They are ascribed to a foreign agency, and in most cases have reference to spirit origin (see SPIRITUALISM). Equally striking is the automatic and dramatic action in a trancelike state. The most remarkable of these likewise requires a volume for its record. The subject develops several cycles of impersonation. In one she is an Indian princess; in another an inhabitant of the planet Mars; in a third the reincarnation of Marie Antoinette. As a Martian she develops a language (founded upon French, which alone she knows) and describes the life on Mars. The interpretations are made through a "medium" (also personified) who is really the means by which the subconscious communicates to the conscious self. Upon awakening from this trance the subject is unaware of the drama that she has enacted.

It is suggestive that in such instances the subconscious, detached procedures do not affect the conduct of waking life. When this occurs, the normal life is disturbed, and we have cases of divided personality. One state with one set of memories, of tastes and inclinations, of desires and habits, is now in the ascendant; and again it falls away and another person with quite opposite character takes her place. Such is hysterical instability. The one state is in ignorance of what the other does; but it can be definitely established that the relation of the two states is such that what is conscious to the one is subconscious to the other. An avenue of communication may be found; and when the two "characters" may be reconciled and merged a cure takes place. The extreme to which states of conflict may be carried are almost incredible; but such instances cannot be summarized.

Cases of a different type are those reported from time to time in which a sudden lapse of personality ensues, and a man wanders from home, is unaware of his previous life, settles in a new region, possibly in the same occupation as he formerly exercised, or it may be in a very different occupation, then suddenly comes to himself, unfamiliar with his new surroundings and oblivious of his recent life. Such divisions of the personality—between functions retained and those lost—may afford a clue to the nature of the defect, but as frequently leave unexplained the exact injury that the brain has suffered. It is established that the set of memories in abeyance is really subconsciously retained; the two states react much in the manner of alternating personalities in cases of incomplete fusion.

Normal characters represent a useful support and relation of conscious and subconscious factors; abnormal characters represent the failure of such relation. Typically these result from conflict; and such conflict-motives have prompted the view of Freud and others that the subconscious is constantly seeking and achieving expression as unfulfilled wishes and incomplete repressions. It is held that a dream is such a procedure. It has one meaning at its surface in the incidents of the dream; and another deeper and latent in terms of desires that are suppressed and reach expression in disguise by the dream route when the conscious censor is asleep.

Every one harbors secret wishes, private hopes, imaginative ambitions—many of them suppressed by social training and the harsh conditions of existence—which form phases of character in conflict with the conscious life that commands. Hysterical cases of divided personality and inconsistency are but exaggerated and irregular instances of the same relation. Freud believes also that the lapses of absent-mindedness express a suppressed intention. The value of his theory lies largely in the search for such inner conflict which it has aroused in cases of nervous and mental trouble; for when once the subconscious source of irritation is found and made conscious, the conflict disappears. The use of the analyses of dreams and other mental states to determine the hidden source of conflict is called psycho-analysis. In a large number of cases the conflicts center about the life of sex, because this is at once a most powerful emotional realm and one concerning which society imposes rigid repressions.

However viewed, the realm of the subconscious—especially for the emotional life, but hardly less so for the intellectual—is of large

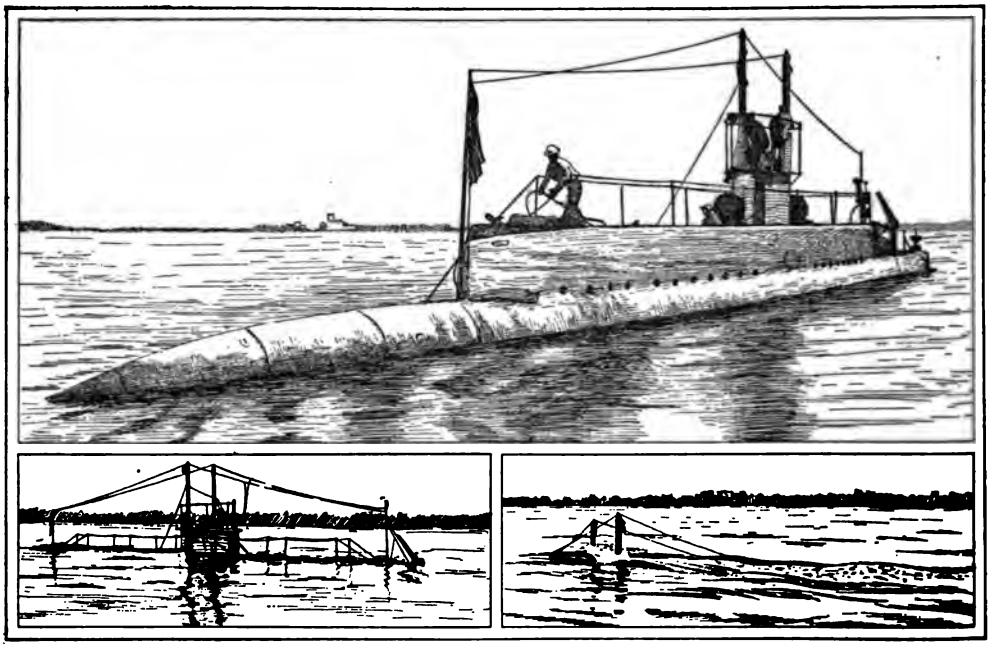
significance for the understanding of mental behavior. Both in its supports and in its conflicts the subconscious discloses the intimate sources of mental life. It must not be thought of as an independent or mysterious agency—a subconscious self that is a double of the self we know—but as an integral phase of the unified self that we recognize as the individual character. The abnormal cases, it is true, suggest independence and division; but the theory of dissociation establishes the gradual links from normal to abnormal that make clear that one relation is responsible for the whole series. Many points remain obscure, and the temptation to fly to extreme hypotheses is strong. It is part of the success of modern psychology to have rescued the realm of the subconscious from confused and superstitious views and to have brought it in line with the central facts of human nature. J.J.

Relating to Various Beliefs. The articles on the following topics, while all do not bear directly on the subject treated above, are of interest in this connection:

Alchemy	Faith Cure
Astrology	Hypnotism
Clairvoyance	Magic
Conjuring	Medium
Demonology	Mesmerism
Divination	Mind Reading
Necromancy	Spiritualism
Occult	Suggestion
Palmistry	Superstition
Phrenology	Telepathy
Physiognomy	Theosophy
Psychical Research	Trance
Psycho-Analysis	Witchcraft

SUBLIMATION, *sub li ma'shun,* the process of changing a solid substance into a vapor and then changing the vapor back to a solid without liquefying it. Sublimation differs from distillation in the changing of the vapor to a solid without the intervening liquid state. The product is known as a *sublimate.* Sublimation is used for purifying substances. In changing the substance to vapor the impurities are left behind and the pure substance is obtained. The flowers of sulphur, that is, the common sulphur of commerce, afford one of the best examples of a substance obtained by sublimation. The flowers of benzoin and salammoniac are made by this process. See DISTILLATION.

SUBMARINE, *sub ma reen',* a vessel which travels under water, but whose only practical use thus far in its history has been as a weapon of destruction. It ranks with the flying machine, a useful development of the arts of peace, as the newest implement at the disposal of warring powers. Except in warfare it has slight



THE MARVEL OF THE UNDERSEAS

Above, a submarine of the United States navy, of the latest type (1917), **running at moderate** speed. Below, at left, the same boat partly submerged, the conning tower **and wireless appearing** above water; at right, only the periscope shows above the surface.

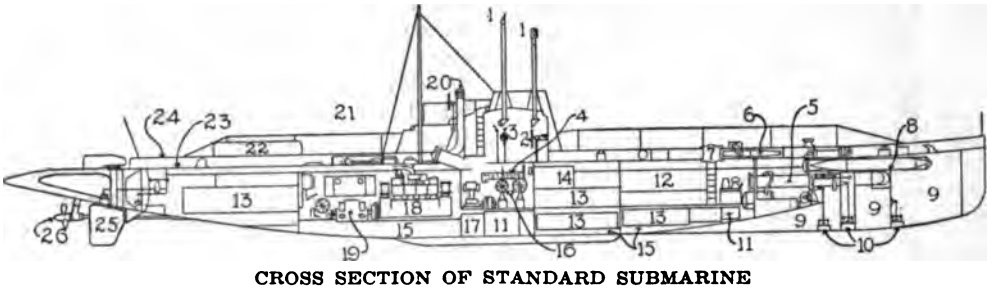
reason for existence. It is true that one submarine made two trips on commercial errands from Bremen, Germany, to Baltimore, Maryland, but these were occasioned by war conditions; such necessity would never arise in times of peace.

The modern submarine is the invention of John P. Holland, an American, but it remained for European nations to bring it to a remarkable degree of perfection and efficiency. To Germany is due the credit of developing an undersea fleet which became the terror of the seas; the United States, which gave this craft to the world, has made slight use of the marvelous invention.

What the Submarine Is. The submarine is a kind of mechanical fish. Though it is neither so comfortable nor so commodious as the ship described by Jules Verne in his engaging book, *Twenty Thousand Leagues Under the Sea,* nevertheless it can dive and travel under water, sinking if need be to a depth of 200 feet, where the pressure on each square inch of surface is 133 pounds, nine times as great as air pressure at sea level.

External Appearance. A submarine afloat looks not unlike a huge cigar of steel plates. It carries a conning tower set in the middle of a flat deck tapering to a point at either end and about twenty-five or thirty feet long. This conning tower, which serves as the captain's bridge when the craft is not submerged, is fitted with a lid about the size of the manholes seen in city streets; when the boat is ready to dive, the captain withdraws into the interior and the lid is screwed down so as to be watertight. In front of the conning tower is the periscope, which is the ship's eye when it is submerged. The periscope is a long, jointed pipe, fitted with reflecting mirrors, which can be extended twenty feet or so above the conning tower. Through this pipe the captain can command the part of the horizon in front of him when he is under water (see PERISCOPE). The ventilators of the submarine are so built that they may be telescoped and the openings through the deck sealed.

Interior Arrangement. The engines and motors are stored in the stern. Each of the two propellers is driven by a separate engine. The storage batteries that feed the motors are under the floor of the cabin. In the largest German submarines of 1917 they have sufficient capacity to run the vessel 200 miles or more under water. When the submarine returns to the surface, the motors are run as dynamos, and the batteries are recharged. The walls amidship and the bows are occupied with huge ballast tanks, into which water is drawn through valves when the vessel is to be submerged. From four to twenty torpedoes, the number depending on the size of the boat, weighing 1,500 to 2,000 pounds each and over sixteen feet long, are stored under the sleeping bunks along the side. The torpedo tubes, which are guns for hurling the torpedoes at the enemy at a rate of thirty-five miles an hour, are in the bows. Air for the crew is carried in steel cylinders under great pressure.

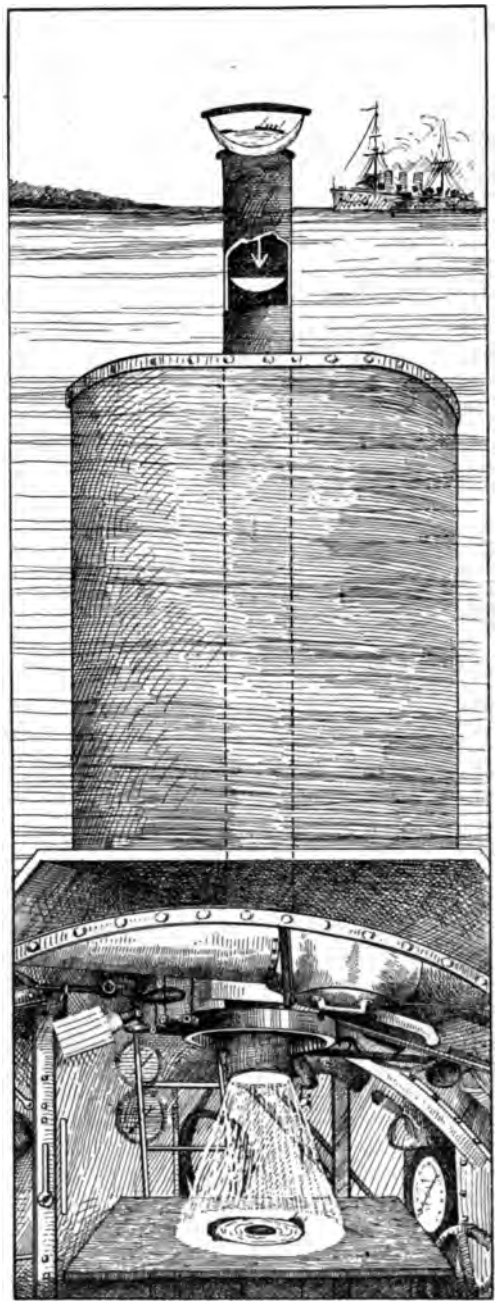


CROSS SECTION OF STANDARD SUBMARINE

1. Periscopes
2. Steering wheel
3. Engine telegraph
4. Air renewing appliance
5. Torpedo tube
6. Disappearing gun
7. Stairway
8. Torpedo
9. Diving tanks
10. Flooding valves
11. Ballast tanks
12. Men's cabin
13. Accumulators
14. Officers' cabin
15. Oil fuel
16. Wheels to diving rudder
17. Fresh-water tank
18. Oil engine
19. Electric motor
20. Ventilator
21. Torpedo hatch
22. Collapsible boat
23. Inner hull
24. Outer hull
25. Steering rudder
26. Propeller

Submarine Service. Submarines of the type described above may be only 100 or 135 feet in length, or they may be 250 feet long. In 1914 these vessels had a steaming radius of about 700 miles; in 1916 larger boats could travel 5,000 miles from their base. With so much machinery and such a weight of guncotton stored in a craft of small dimensions, it can readily be seen that there is not much room left for the crew. Space is, indeed, at a premium on board a submarine. Crowded into

narrow quarters, unmercifully tossed by waves, surrounded by driving steel cranks and rods and deafened by the pounding of the engines, the men must have strong nerves, under perfect control, to endure the strain to which they are subjected. The crew, therefore, are all picked men, drilled to the highest point of efficiency for the most perilous and nerve-racking service in the world. Notwithstanding this care in selection, few men in submarine warfare are able to remain long on duty.



THE PERISCOPE

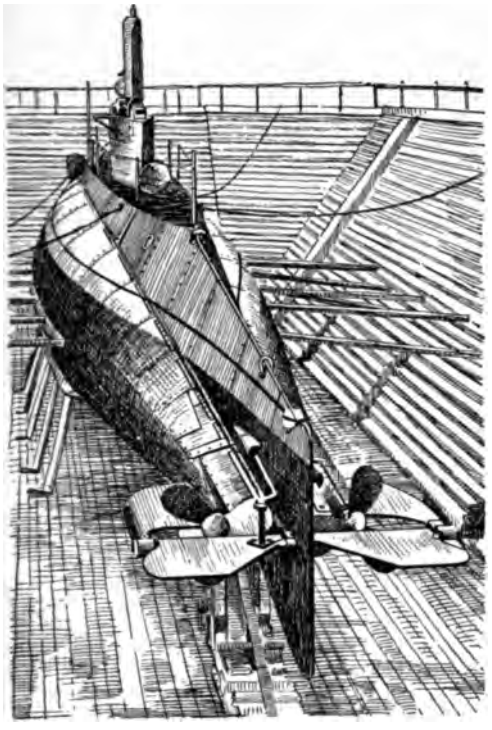
The lower part of the picture shows the roof of the submarine, with instruments attached to the roof. In the center is the periscope, rising above the superstructure. The image picked up by the periscope is reflected downward upon a table, and on this table is pictured the movement of events on the surface of the water.

In Action. When at anchor, the submarine shows two or two and one-half feet of dull gray hull above the water. When racing on the surface through a lively sea, the whole craft is awash. It maintains then a speed of about twelve or thirteen miles an hour. When the order is given to dive, the hatches are screwed down and the valves in the water tanks opened. Just enough water is admitted so that the ship would tend to float if it were not for the downward push given by horizontal rudders at the stern. Meantime the engine cranks have been detached from the oil engines and attached to the electric motors. These motors drive the vessel through the water at about nine miles an hour, "porpoising" at intervals but running for the most part with only the periscope and ventilators showing to the enemy. When within 800 yards or so of hostile craft, the vessel comes suddenly to the surface, lets drive its torpedo and then sinks at once from sight. Before the end of 1917 German submarines had been so perfected that they could rise to the surface, discharge a torpedo and submerge again in less than a minute.

Cost. Both in first cost and in expense of maintenance, the submarine is a relatively-cheap naval arm. The cost of the average submarine in 1914 was about $500,000; it was about 135 feet long. In 1917 the size and equipment of the German types had been increased, and the cost had risen to nearly $1,000,000. It can be maintained for about $22,000 to $35,000 a year, whereas a battleship costs over $10,000,000 and for maintenance about $800,000 annually. The life of a submarine, however, is comparatively short. In respect to enduring qualities it is an expensive craft.

Protection of Ships. The great loss of shipping resulting from the submarine warfare conducted by Germany was a direct challenge to the ingenuity of the opposing nations. After the entrance of America into the war, Thomas A. Edison and others worked out a system of protection for ships that included the following expedients: Hard coal was used in place of soft coal as fuel, to lessen the cloud of smoke that

makes a ship visible to a submarine for a distance of twenty-five miles. High masts and smokestacks were eliminated, and the sides of the vessel were disguised with a system of



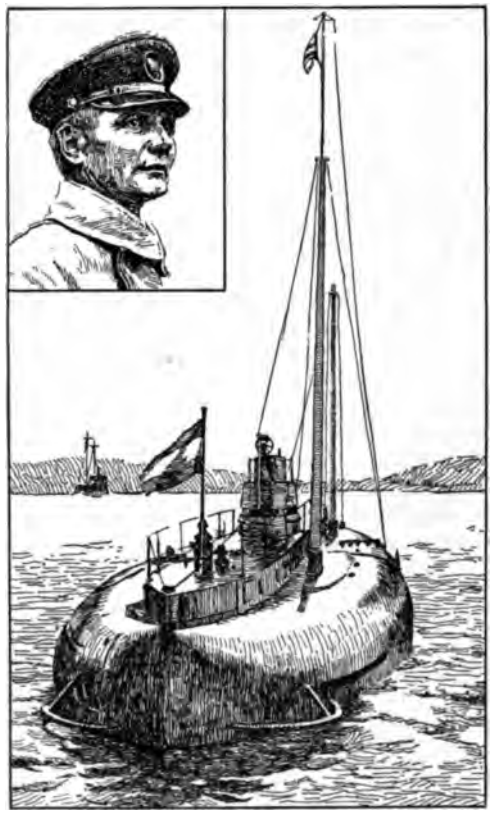
A BRITISH SUBMARINE

The *H-20*, shown above, is similar in construction to the American type. This illustration of a submarine in dry-dock presents a good view of the exterior design.

camouflage—that is, painted a gray that makes a ship invisible to a submarine until about a mile distant. Ships were equipped with smoke bombs, to be used in case the submarine came close enough to be dangerous. These bombs are dropped upon the water in the path of the pursuing submarine, and on contact with the water they begin to smolder, covering the sea with a dense, heavy cloud that effectually conceals the vessel. A system of increased flotation was also devised, greatly diminishing the liability of sinking. Submarine destroyers, small, swift boats manned by a few men, were put upon the seas in large numbers to carry on offensive warfare. What are known as depth bombs were invented to destroy submarines. These can be shot from guns and they explode with great violence at a designated depth in the water.

History. The submarine, like the aeroplane, has been long a dream of man. The first vessel of the type is said to have been constructed by a Dutch physicist, Cornelius van Drebbel, who exhibited it in the Thames and even invited King James to have a ride with him. The boat was built of wood and propelled by twelve rowers; little else is known about the original submarine.

The first submarine to be used in war was built by a colonial, David Bushnell, during the American Revolutionary War. Bushnell's craft, like Van Drebbel's, was propelled by oars. He called it the *Turtle*. This boat was submerged and brought under the hull of a British ship in New York harbor, but the operator found it



THE DEUTSCHLAND AND ITS MASTER

Captain Paul Koenig, "admiral of the underseas," and the vessel in which he made two trips to America in 1916.

impossible to drill through the ship's bottom and had to abandon his craft.

Robert Fulton, inventor of the steamboat, constructed the first cigar-shaped submarine while he was living in France, and gave successful exhibitions in the harbor of Brest, afterwards taking his invention to England. This submarine was known as the *Nautilus*—a name

borrowed by Jules Verne for Captain Nemo's ship. The *Nautilus* stayed under water for five hours and blew up an old hulk with a mine; nevertheless, its inventor received no encouragement and turned his attention to the steamboat.

During the War of Secession the Confederates built a submarine known as the *David,* with which they succeeded in wrecking the *Housatonic,* a Federal ship anchored in Charleston harbor. The *David* sent six crews to the bottom of the sea. It was about sixty feet long and was manned by nine men, eight of whom propelled it by working a screw shaft by hand while the ninth steered.

In developing the practicable submarine of the present, the American and French nations took the lead. Two early French submarines which proved capable of service were the *Gymnote* and the *Goubet.* They were tested at Toulon and Cherbourg in 1889, and were maneuvered with considerable ease. The *Goubet* had a displacement of two tons. It was equipped with an electric motor and a storage battery; air was furnished from reservoirs, as in the latest type. The type of craft which has been developed by the chief nations was the invention of John P. Holland in 1877. It is the Holland vessel that is described in this article.

The submarine was a most important and the most dreaded factor among the entente allies in the War of the Nations. In the winter of 1916-1917 the Germans proclaimed it their chief reliance in the effort to secure victory. The story of this submarine struggle is told in the article WAR OF THE NATIONS. G.B.D.

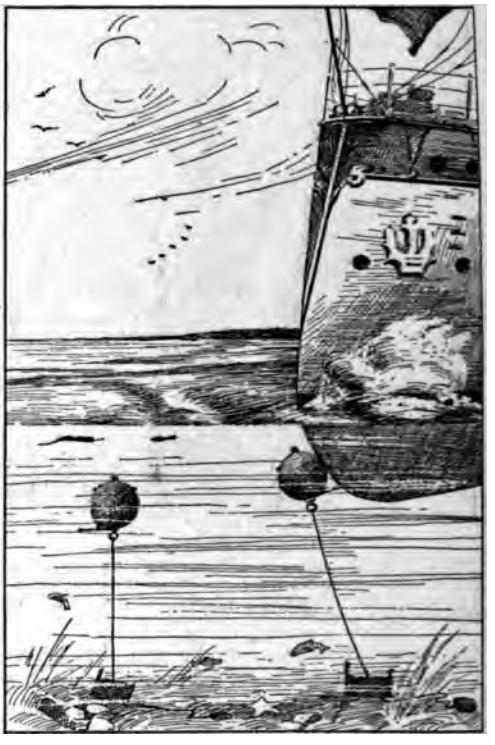
No book written prior to 1914 is of value as a description of the submarine of to-day. However, the following are recommended for outlines of the principles of construction and for the history of the craft: Field's *Story of the Submarine;* Bishop's *The Story of the Submarine.*

SUBMARINE CABLE. See CABLE, SUBMARINE.

SUBMARINE MINE, an unseen weapon of destruction against which the mightiest battleship is helpless, a hidden menace more dreaded by naval men than any gunfire or attack by overwhelming visible forces. Great ingenuity has been used in the preparation of mines which may in an instant turn the most peaceful harbor or the smoothest seas into a scene of death and disaster. It was not until the War of Secession that submarine mines were regarded as dangerous, or even practicable; but during that great struggle they acquired such a record for destructiveness that it became apparent they must play an important part in wars of the future.

Modern submarine mines are of three kinds—observation, electro-contact and automatic. Not only are these mines, when laid, of terrible destructive power, but the placing of them in the sea or inland waters is attended by considerable danger.

Observation Mines. As the name implies, these mines are placed in waters that may be



SUBMARINE MINES

They may rest fastened to the sea bottom or may be arranged to float at any distance from the surface.

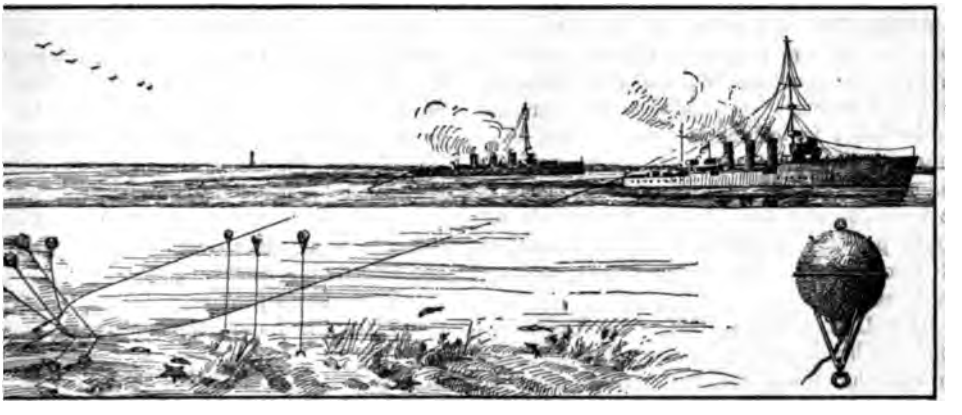
overlooked from the shore. They may be arranged singly, in groups, or in line across the openings into harbors. This type of mine has a casing of steel, is buoyant, and is loaded with from 200 to 500 pounds of wet guncotton. It is destructive within a radius of thirty feet when exploded below the surface. Observation mines are exploded from the shore merely by switching on an electric current. A group of three, five or seven mines, or one mine only, may be thus exploded at a time; the defended water is plotted out, showing the observer exactly the position of ships entering and what mines must be exploded to destroy them.

ctro-Contact Mines. These mines are either of iron or steel, and contain a e of seventy-five pounds of guncotton, is sufficient to destroy the biggest ship . They lie nearer the surface than obser- n mines, as they are intended to explode actually in contact with the bottom of sel. Running through the explosive charge electric wire called the firing circuit. To lete the circuit the mine must be tipped to an angle of seventy degrees. At this mercury, placed in the pedestal carrying lectric wire, also tilts and bathes both ends e wire, completing the circuit and causing xplosion. The electric current is supplied a shore battery, and all that is needed to these mines harmless is to turn off the nt.

tomatic Mines. These are the most dan- s to handle, as they contain within them- all that is necessary for explosion, and do lepend on an electric spark flashed from hore. The firing battery is in the shell . In appearance and construction these s are similar to the other two varieties, re either spherical or cylindrical in shape. are absolutely beyond control when once and a fishing boat is as liable to destruc- as a warship. Friend and foe are equally nger, unless the exact location is known; anchored by weights they are carefully ed for the benefit of friendly and neutral ing. Automatic mines, when scattered in- minately over the sea, are called *floating* s. Drifting according to wind, tide and nts, they are a menace to all shipping.

ne Laying. The proper placing and laying ines is a complicated operation. Mines ot be dropped haphazard into the sea. The position must be carefully studied and the depth beneath the surface accurately calculated, as also must be the localities where the effect will be greatest. In mines to be exploded by electric current from the shore the laying of cables is a work requiring care, and the wires connecting the mines to the cable and the shore battery must be sufficiently strong to anchor the mine, and of a sufficient length to keep the explosive at such a depth that it will be out of the path of vessels allowed to enter or leave harbor.

Searching for Mines. The accompany illustration clearly shows the principal method of searching the sea for suspected mines. The



SEARCHING FOR MINES IN A MINE FIELD

work involves great difficulty and danger, as the mines can be located only after the vessels have successfully passed over the zone of danger. The two vessels are connected by a heavily-weighted cable, which they drag between them. Mines thus caught are destroyed. If an electrical cable is caught in the net it is at once cut, rendering all mines connected with that cable ineffective. Areas of mined waters may be rendered safe also by countermining, that is, by exploding mines in the suspected area. The explosions would cause all previously laid automatic mines to explode and might force adrift mines attached to electric cables and render them harmless.

In the War of the Nations. Numerous warships, destroyers, passenger steamers and other vessels were destroyed by mines during the great war. These instruments of destruction were laid principally in the North Sea, the English Channel and the Mediterranean Sea, but other waters traversed by ocean craft were not entirely free. Both the British and the German naval departments put forth special

efforts to combat this menace to their shipping. In the summer of 1917 the Germans were especially active in mining operations in the North Sea, and their mine layers had numerous fights with British fighting craft. The Germans also built a special type of submarine for mine planting. One such submarine, captured by the British, carried sixteen mines, placed two by two in inclined tubes, the lower end of each tube being open to the sea. Because the submarine can work under water, it is admirably adapted to operations that must be carried on without the enemy's knowledge. F.ST.A.

Consult Sueter's *Evolution of the Submarine Boat, Mine and Torpedo;* Sleeman's *Torpedoes and Torpedo Warfare.*

SUBPOENA, *sub pe'na.* If an officer of a court of law serves upon you a written notice to appear at a certain hour and give testimony in a case in court, you must obey the command or be liable for contempt of court (see CONTEMPT). The name applied to such a notice is *subpoena,* which is Latin for *under penalty.* If it is a *subpoena duces tecum* (bring with you under penalty) it contains a clause demanding that you bring to court certain papers, books or other exhibits.

SUBSIDY, *sub'si di.* When the Union Pacific Railroad was built the United States granted the railway corporation tracts of public land located along the line as a partial reimbursement for the vast sum of money expended in building the railroad. Since then other great railroads have received such important assistance. Aid of this nature extended by a national, state or city government to some private enterprise, for the purpose of helping it become established on a firm financial basis, is a *subsidy,* and the corporation or firm receiving the aid is said to be *subsidized.* Premiums or bounties on exports and bounties paid for killing animals are a form of subsidy.

The wrong use of this sort of aid has led many to think that any subsidy is a bribe; on the contrary, in such instances as that of the Union Pacific Railroad, it is a necessity and is granted because the government believes that the benefit derived from the enterprise will be greater than its cost to the state. Merchant marines are often built up by the granting of ship subsidies. Before the War of the Nations Germany gave $800,000 a year to the Hamburg-American Line for the partial maintenance at sea of the great *Vaterland,* the *Imperator* and other passenger vessels which could not be made self-sustaining. This general policy built up a great merchant fleet for the German Empire. Formerly in England a subsidy was a tax levied upon individuals for special aid to the king in times of stress. In English history it has meant the financial aid rendered by the nation to another at war. See BOUNTY.

SUBTRACTION, *sub trak'shun,* the process of finding the difference between two numbers, or of taking one number out of another. The number subtracted is called the *subtrahend.* The number out of which the subtrahend is taken is called the *minuend.* The result is called the *remainder,* or *difference.*

Teaching of Subtraction. Addition and subtraction go hand in hand, but the latter is more difficult of mastery because it is "association backward," while addition is "association forward." The mind readily turns the new problem of subtraction into the more familiar one of addition. One well-known author on the subject speaks of this translation of subtraction into addition as "having the advantage of using only one table for addition and subtraction and of saving much time in operation." Another refers to it as "primitive, barbarous, awkward and time destroying."

1. Sarah has 9 pennies and Tom has 5 pennies. How many more has Sarah than Tom?

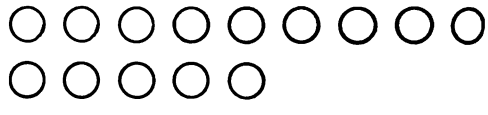


FIG. 1

Sarah has 4 more.

How many pennies must Tom get to have as many as Sarah? He must get 4.

In both the above cases we see that the difference between 5 and 9 is 4, and that 4 must be added to 5 to get 9. In addition we say it in this way: $5+n=9$. When we have the answer, we say $5+4=9$. In subtraction we say $9-5=n$, and having the answer, we say $9-5=4$.

Addition	Subtraction
$8+n=12$	$12-8=n$
$8+4=12$	$12-8=4$
$9+n=16$	$16-9=n$
$9+7=16$	$16-9=7$

In addition we say, "What number added to 8 gives 12?" In subtraction we say, "8 taken out of or 'away from' 12 leaves what?" Those who would always look at the problem from the viewpoint of addition follow the well-known "Austrian Method" of subtraction.

2. Sarah had 9 pennies, and gave 5 to Tom. How many pennies has she left?

Here we clearly have the problem, $9-5=n$, or, "When 5 is taken out of 9, how many are left?" This is not the problem of the difference between 9 and 5, like problem 1, and it is seen thus:

FIG. 2

Concrete Work. As in addition (see ADDITION), much *concrete* work should be done in building up groups and taking them apart to make subtraction clear; for example, a group of 12 pennies may be separated in various ways: $12=5+7$, $12-5=7$, $12-7=5$. This *formal* way of writing it must be introduced slowly and carefully, with much *oral* work preceding it and accompanying it. Below are suggestions for concrete material:

1. Groups of pennies, nickels, dimes.
2. Groups of inch cubes, of cardboard squares.
3. Compare various objects as to length, width and height by measuring with foot rule or yard rule.
4. Compare heights of children.
5. How much farther can John jump than Dan? Measure in inches and subtract.
6. Compare weights of articles.
7. Compare costs of various articles, using money.
8. Have foot rule, yard rule, scales, money, pennies, nickels, dimes, dollars (real money), cubic blocks, etc.

Home Help. At home mother or father may do much to help at this point, for the freedom of movement and variety of material, and opportunity for measuring and grouping and thus getting material for comparison by subtraction, are much greater at home than in the ordinary schoolroom. (For further suggestion as to home help, see ADDITION.)

Suggestions for Rapid Work. 1. Cards like the illustration may be held up before the class by the teacher for an instant, and the children may write each answer. When a number of cards have been shown in this way, the answers may be given, and each child may know where he has made an error. In checking in this way, the teacher finds which combinations give greatest difficulty. The class may take sides in this, seeing which side has the greater number correct. This may be done orally as a rival game or just as a quick review.

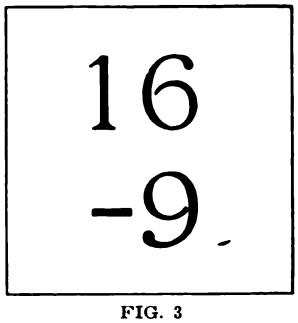


FIG. 3

2.

11	21	31	41
−3	−3	−3	−3
12	22	32	42
−7	−7	−7	−7

A set of cards like the above may be passed to the class and exchanged among the children; the answers may be given orally, or written on the blackboard or on paper, but not on the card. Thus the same cards may serve many classes.

3.

12		29	
8		18	
9		15	
11		17	
13	−5	9	−9
15	−6	11	−8
6		21	−7
7		12	
14		22	
24		27	

Placing lists of this kind upon the blackboard gives opportunity for comprehensive review, and for repeated review of any difficult subtraction. The lists may be long or short and the subtrahend may be changed many times.

4.

n	n	n	n	n	n	n
−8	−9	−7	−5	−6	−4	−6
15	9	3	9	7	9	0

The problems are on the blackboard; the child goes quickly to the board, erases n and puts the minuend number in its place.

5.

12	16	13	23	12	12
$-n$	$-n$	$-n$	$-n$	$-n$	$-n$
7	7	4	14	9	5

The child goes to the board, erases n and puts the subtrahend number in its place.

6. Under ADDITION many suggestions will be found that may be changed so as to serve the purpose of the teacher in subtraction (see ADDITION).

Subtraction of Numbers of Two or More Digits. (a) Use dimes and pennies and the first step is very simple. The child has 2 dimes and 7 pennies. He spends 9 pennies. What has he left?

dimes	pennies		dimes	pennies
2	7	=	1	17
	−9			−9
				8

Have a stack of pennies so that he may change his dime for pennies.

(b) $\begin{array}{r} 27 \\ -9 \\ \hline \end{array} = \begin{array}{r} 10+17 \\ \quad -9 \\ \hline 10+\ 8=18 \end{array}$

(c) $\begin{array}{r} 14 \\ +8 \\ \hline 12 \\ 10 \\ \hline 22 \end{array} = \begin{array}{r} 22 = 10+12 \\ -8 \quad\quad -8 \\ \hline 14 = 10+\ 4 \end{array}$

$\begin{array}{r} 48 \\ +5 \\ \hline 13 \\ 40 \\ \hline 53 \end{array} = \begin{array}{r} 53 = 40+13 \\ -5 \quad\quad -\ 5 \\ \hline 48 = 40+\ 8 \end{array}$

In the above addition we understand how 12 is made by 4 and 8, and how 13 is made by 5 and 8, and see that when we come to subtract we must think of 22 as 10+12, and 53 as 40+13 (see ADDITION).

$$\begin{array}{r} 65=50+15 \\ -49=40+\ 9 \\ \hline 16=10+\ 6 \end{array} \qquad \begin{array}{r} 91=80+11 \\ -48=40+\ 8 \\ \hline 43=40+\ 3 \end{array}$$

Explanation: The subtraction is done beginning at the right: 9 from 15, 6; 40 from 50, 10. Then the sum of 10 and 6 is written to the left.

(d) $\begin{array}{r} 193=100+80+13 \\ -147=100+40+\ 7 \\ \hline 46= \quad\quad 40+\ 6 \end{array}$

$$\begin{array}{r} 243=200+30+13=100+130+13 \\ -198=100+90+\ 8=100+\ 90+\ 8 \\ \hline 45= \quad\quad\quad\quad\quad\quad 40+\ 5 \end{array}$$

(e) In time the writing out in full may be dropped and the separation done mentally, as follows:

$$\begin{array}{r} 243 \\ -198 \\ \hline 45 \end{array}$$

Explanation: Take 10 from 40 or 1 ten from 4 tens and add it to 3, which gives 13. 8 from 13 leaves 5. Take 100 from 200 and add it to 30, making 130, or take 100, which is 10 tens, and add it to 3 tens, making 13 tens. 9 tens from 13 tens leaves 4 tens or 40. The result is 45. This can be seen very clearly with dollars, dimes and pennies.

Other Methods. There are other methods of subtraction in common use, but the above is explained most easily to the young mind. The Austrian Method sees subtraction as addition:

$$\begin{array}{r} 657 \\ -398 \\ \hline 259 \end{array}$$

Explanation: 8 and 9, 17; 10 and 5, 15; 4 and 2, 6. The minuend is held in mind as the sum of two numbers and the subtrahend as one of these numbers. As the other number is found in each column, it is placed in the answer.

Another method:

$$\begin{array}{r} 657 \\ -398 \\ \hline 259 \end{array}$$

Explanation: 8 from 17, 9; 10 from 15, 5; 4 from 6, 2. 10 is added to the minuend to make 7, 17. To equalize matters 1 ten is added to 9 tens in the subtrahend. 10 tens is added to 5 tens in the minuend, and again to equalize matters, 100 (which is equal to 10 tons) is added to the subtrahend. It is seen clearly in the following form:

$$\begin{array}{r} 657=600+50+7 \\ -398=300+90+8 \end{array}$$

It becomes for easy subtraction:

$$\begin{array}{r} 600+150+17 \\ 400+100+\ 8 \\ \hline 200+\ 50+\ 9=259 \end{array}$$

110 has been added to both minuend and subtrahend. This method is in common use among adult people, and is less strain upon the mind than the first method presented. But it should not take the place of that method with young children because of the difficulty to the child mind of understanding it. It is easily adopted later.

Place Value. Read in connection with subtraction the articles ADDITION and NOTATION, where *place value* is discussed. A.H.

SUBWAY, or UNDERGROUND RAILWAY, a tunnel or system of tunnels for the purpose of placing a railroad beneath the level of the street. Such systems are coming more and more into use, and in some cities, especially New York and London, they form a vast network of underground railways. London was the first city to adopt subways, and now has five systems affording quick and economic transportation to all parts of the city and suburbs. A subway destined to grow to large proportions was opened in Buenos Aires in 1913.

In the United States subways have been constructed only in New York, Boston, Philadelphia and Chicago, but have for some time been under consideration for other cities. The New York subways form the largest underground railway system in the world. Chicago's subways as yet are for freight only, and are nearly seventy miles long, under the central business district. The city still relies on its street railways and elevated railways to provide passenger service, but passenger subways on a large scale are planned.

The first subway built in London was operated by steam locomotives. All subsequent subways have been operated by electricity.

The cost of construction is very high, the New York system requiring an outlay of an average of $2,000,000 per mile, sometimes reaching as high as $5,000,000 per mile, exclusive of equipment. The two-track subways in Paris cost $850,000 per mile, while the London "tubes" cost about $1,500,000 per mile, exclusive of equipment.

The fare in American subways is the same as that on most surface cars, which is five cents. In London, the fare varies with the distance, the minimum being two pence (four cents). In Berlin the charge is from ten pfennige, or two cents, to thirty-five pfennige, or seven cents, depending on the class of ticket and the distance.

New York City Subways. Rapid transit in the United States reaches its highest development in its most congested district, New York City. The total number of passengers carried on all New York subways is about 1,000,000,000 a year, an average of 3,000,000 a day. For details of the New York subways, see NEW YORK, subhead *Transportation.* W.F.Z.

SUCCESSION, *suk sesh'un,* **WARS,** those wars that were caused by rival claims to the inheritance of a throne. Four important wars in modern European history are known by this name, the War of the Spanish Succession, the War of the Polish Succession, the War of the Austrian Succession and the War of the Bavarian Succession.

The War of the Spanish Succession. This struggle began in 1701 and lasted until 1714. It is also known in American history as Queen Anne's War.

Charles II, king of Spain, was childless, and the question as to who would be his successor was of vital importance to Europe. Family alliances among related sovereigns were very common in those days, and if a foreign-born prince ascended the throne of Spain as nearest heir, which seemed inevitable, an entirely new alignment of the European powers was apt to be the result. The laws governing the succession were so involved and the claims of the different heirs were so conflicting that it is almost impossible, even at the present day, to know who rightfully should have worn the Spanish crown. Suffice it to say, the valid claims soon were narrowed down to three heirs, the French prince Philip, duke of Anjou and grandson of Louis XIV, Joseph Ferdinand, the young electoral prince of Bavaria, and the Archduke Charles of Austria, son of Emperor Leopold I.

The leading powers of Europe joined in a treaty in 1698, according to which Joseph Ferdinand was to become king of Spain, and France and Austria were to be compensated with territories from the extensive Spanish possessions in Italy and other parts of Europe. Unfortunately, the electoral prince died, and the matter was unsettled again. A second treaty, in 1699, arranged that the Archduke Charles was to receive the Spanish crown, and the French royal family would be indemnified by additional Spanish territory. Everything seemed to be arranged in order to guarantee the peace of Europe when King Charles II died in Spain on November 1, 1700, leaving a will by which he bequeathed the crown to the French prince, Philip of Anjou. Louis XIV then broke his solemn word given when he signed the treaty, proclaimed his grandson to be king of Spain and declared that "the Pyrenees were no more." All Europe stood aghast at the prospect of the virtual annexation of the Spanish empire to the preponderant power of France, and Louis further angered the English by recognizing the son of the dethroned James II as the rightful king of England.

Almost immediately the Grand Alliance was formed between England, the Holy Roman Empire, the Netherlands, Prussia and Hesse in order to prevent Philip of Anjou from becoming king of Spain and to aid the Archduke Charles to ascend that throne in his place. The allied forces were placed under the command of two great generals, the English Duke of Marlborough and Prince Eugene of Savoy, under whose leadership the French were defeated decisively during the years 1704 to 1709 in the well-known battles of Blenheim, Ramillies, Oudenarde and Malplaquet. The fighting was for the most part in Germany and the Netherlands, although there were several campaigns in Spain which finally degenerated into guerilla warfare. These ended with the establishment of Philip as king and the extension of his rule over most of Spain.

The allies possibly might have overthrown Louis XIV and seized Paris had not dissensions broken out among them, and in addition party politics in England caused the Tory government of that country to desire peace in order to discredit the victorious Marlborough, who was a prominent Whig. Louis XIV, although badly defeated and his country exhausted, took heart and by skilful diplomacy brought about the Peace of Utrecht in 1713, by which he obtained fairly favorable terms,

including the recognition of his grandson as king of Spain. France and Spain never were united, however. The emperor refused to sign the Treaty of Utrecht and did not make peace until a year later, when he found it necessary to give way and sign the Treaty of Rastadt upon almost the identical terms of the Peace of Utrecht.

Consult Parnell's *War of Succession in Spain;* Stanhope's *History of the War of the Succession in Spain.*

The War of the Polish Succession, fought during the years 1733 to 1735, was caused by the election by Polish nobles of Stanislaus Leszczynska, father-in-law of Louis XV of France, as king of Poland. Russia and Saxony forced the Poles to accept the Elector Augustus of Saxony as king, and war followed. France failed to keep Stanislaus on the Polish throne, but he was given the duchy of Lorraine, which reverted to the French crown at his death in 1766. Although France ultimately gained this territorial accession, its prestige received a damaging blow.

The War of the Austrian Succession was also known in America as King George's War. The struggle began in 1740 and lasted until 1748. It was caused by the death in the former year of Emperor Charles VI, who left as heiress to his dominions a daughter, the famous Maria Theresa. The great powers of Europe had guaranteed her succession to the Austrian dominions by the Pragmatic Sanction, but they broke their pledged word and attempted to despoil the young princess of her inheritance.

The first to attack Maria Theresa was Frederick the Great, king of Prussia, who promptly and without scruple invaded and conquered the province of Silesia. During the next year, 1741, he strengthened his hold upon the territory by an overwhelming victory at Mollwitz. France and Spain and the two strong German states of Bavaria and Saxony joined Prussia, and for a time Maria Theresa was threatened with the loss of her dominions. The Elector Charles of Bavaria was chosen emperor by means of the support of the allies, and the Hapsburg family for the first time in 300 years failed to hold the throne of the Holy Roman Empire.

However, Maria Theresa saved her crown and most of her dominions by her own indomitable courage and vigorous leadership. She appealed to the Hungarians to defend her, their queen, and also roused the other people of her varied dominions to her support. Furthermore, she was aided by an alliance with the great maritime powers, England and Holland, who crushed the power of France at sea. Maria Theresa soon drove out the new emperor, Charles VII, even from his Bavarian dominions, and he died in 1745. She then received the title of empress through the election of her husband, Francis of Lorraine, as Emperor Francis I.

Maria Theresa, after making two separate treaties of peace with Frederick the Great, finally separated this most dangerous antagonist from the alliance with her other enemies, but accomplished it only at the price of the cession to him of Silesia. Also with the aid of the armies of her English and Dutch allies she carried on the war against France and Spain with great vigor and success. However, her victorious career was checked by the brilliant victories of the French army in the Austrian Netherlands under the command of the German-born Marshal Saxe, and as her dominions, with the exception of Silesia, were safe under her control, she was induced by the more peaceful attitude of her allies, England and Holland, to agree to make peace.

The Treaty of Aix-la-Chapelle, which was signed in 1748, finally ended the war. Maria Theresa, however, refused to consider that she had lost Silesia beyond recovery. The empress at once began the negotiations that led to the realignment of the European powers and to her final attempt to destroy Frederick the Great and regain Silesia, through a later conflict that was to be known as the Seven Years' War.

Consult Shrine's *Fontenoy and the War of the Austrian Succession.*

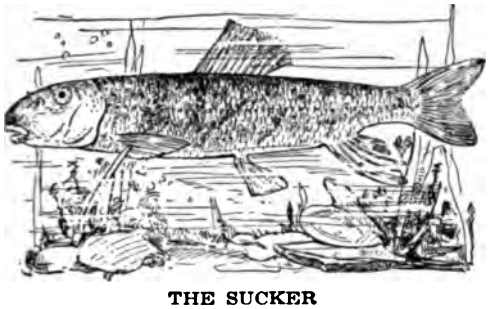
The War of the Bavarian Succession was a short quarrel during the years 1778 and 1779 between Prussia and Austria over the succession to the throne of Bavaria and the disposition of part of the Bavarian territory. The Elector Maximilian Joseph died in 1777, leaving no direct heirs. Austria then attempted to dominate the affairs of Bavaria and to dictate the succession, thus arousing the jealousy of the ever-watchful king of Prussia, Frederick the Great. Both Prussia and Austria invaded Bavaria with their armies, and a bloody war seemed inevitable, but no serious battle was fought and the dispute finally was compromised. Neither country was anxious for war, and France and Russia used their good offices to mediate between them and secure peace. The Treaty of Teschen was signed in 1779, and both Austria and Prussia were satisfied by certain territorial gains. This war was not of

very great historical importance except for the fact that by accepting the mediation of Russia the powers recognized that country as a member of the family of European nations, and its influence increased from that time. E.D.F.

Related Subjects. For other details as to the Succession Wars, the reader is referred to the following articles in these volumes:

Aix-la-Chapelle, subhead *Treaties of Aix-la-Chapelle*
Blenheim
Charles VI (Holy Roman Emperor)
Eugène, François
French and Indian Wars, subheads *Queen Anne's War* and *King George's War*
Frederick II (of Prussia)
Louis XIV (of France)
Maria Theresa
Marlborough, Duke of
Pragmatic Sanction
Spain, subtitle *Government and History*

SUCK'ER, the name given to several kinds of fish belonging to the catfish family, which have mouths with thick, fleshy lips. There are several species, all of moderate size, and all, except one Siberian group, natives of North



THE SUCKER

America. They are dull-colored except in spring, when the males have rose or orange markings. Suckers are found in rivers, lakes, bayous and mill ponds, where they obtain their food by sucking up mud and soft organisms from the bottom. They are little used for food, because the flesh is soft and tasteless.

SUCK'LING, Sir John (1609-1642), an English lyrical poet of the metaphysical group, born at Whitton, Middlesex, and educated at Cambridge. He fought under Gustavus Adolphus, amused and startled London with his wit, bravado and spendthrift habits, and spent immense sums of money for the king in the conflict with Cromwell. Accused of taking part in the plot to release Strafford from the Tower, he fled to the continent, was arrested, tried before the Spanish Inquisition and released, then returned to Paris and there poisoned himself. His *Why So Pale and Wan, Fond Lover; A Ballad upon a Wedding* and *I Prithee Send Me Back My Heart* are famous.

SUCRE, *soo'kra,* the official capital of Bolivia, known as Chuquisaca until 1826, when it was named Sucre in honor of the first President of the republic. Though Sucre is officially the seat of government, La Paz (which see) is the actual legislative and executive capital. The former is, however, the seat of the Supreme Court of Bolivia. Sucre lies in the midst of picturesque mountain scenery on a plateau 9,328 feet above sea level, and is situated on a small tributary of the Pilcomayo, 318 miles southeast of La Paz. It was famous in colonial days for its wealth, which was derived from the silver mines in the vicinity, and monuments to its former grandeur are seen in its buildings and institutions. Its Saint Xavier University, with schools of law, medicine and theology, is reputed to be the oldest in South America. The city has mining and agricultural interests. It was founded in 1536 and was originally called La Plata. Population, estimated in 1915, 29,686.

SUDAN, or **SOUDAN,** *soo dahn',* a vast region of Central Africa, about twice the size of Canada's Northwest Territories, extending from the Sahara Desert on the north to Congo Free State on the south, and from French Senegambia on the west to Egypt. The region is inhabited by negro and Arab tribes, but is controlled by European powers; the extreme western section is under French influence, and the eastern section, or Anglo-Egyptian Sudan, is governed by the British. In this latter the natives are given the less important government positions, but the governor and his assistants are British officers; however, Darfur, a district within the limits of the English Sudan, is still ruled by its hereditary sultan.

The northern plains of the Sudan, which are continuations of the Sahara Desert, are practically barren, but in the western and southern districts, watered by the Niger and Congo rivers, vegetation is luxuriant. Bananas and other tropical fruits, sugar, rice and cotton are raised and exported. Great forests yielding gums, rubber and ebony border the streams, on which navigation in the light native boats is usually dangerous because of the numerous crocodiles and hippopotami. Around Lake Chad there are dense, swampy jungles inhabited by herds of wild elephants. These regions furnish most of the world's supply of ivory and gum arabic.

In the eastern section, where there is less vegetation, the natives raise large herds of cattle, camels, sheep and ostriches. Cattle raising

is increasing as a result of the investigation and work of the government in the elimination of the cattle disease. Gold is the only mineral which at present is being mined successfully, though iron and silver are also found in abundance.

The English have introduced modern improvements in communication and transportation; in 1914 there were 1,550 miles of railroad; 2,100 miles of local telegraph, besides telegraphic communication with Cairo and two cities of Eritrea. Mail and messages are delivered by native carriers from seventy-five post offices. There are many schools throughout the Sudan where natives are taught reading, writing and arithmetic in their own language, and six primary schools in the chief cities, having an attendance of about 1,000 pupils. Boys are given further training in the government offices, industrial workshops and at Gordon College in Khartum. The education of women has been begun, and there are now three girls' schools in which over 175 pupils are enroled. The work of the scientific research laboratory for the furtherance of agricultural experiment and education is doing much to develop the agricultural possibilities of the region. As in Egypt, English control is proving to be a great factor in the development of the country and the enlightenment of its inhabitants. The number of people is not known. E.B.P.

Related Subjects. The following articles in these volumes will be of interest in this connection:

Congo River	Khartum
Gordon, Charles George	Niger
Ivory	Sahara

SUDAN GRASS, a hay plant belonging to the sorghum family, introduced into the United States in 1909 from Khartum, Sudan, by the Federal Department of Agriculture. First tested in Texas, it gave such excellent results that since then thousands of acres have been planted in the South and Southwest, both in humid and in irrigated sections. Sudan grass has a fibrous root system and is grown from seed which must be planted every year, as it is an annual. As it has no perpetual rootstock, there is no danger of its becoming a weed and a pest. The grass is cultivated both as a forage plant and for its seed. Sudan hay has a higher feeding value than timothy, and is liked by stock, especially hogs. It is one of the best drought-resisting plants known to American farmers, and can be grown on almost any kind of soil. Two cuttings of hay a year can be obtained in semiarid regions, and three in humid sections. The first crop matures in from sixty to eighty days.

SUDBURY, *sud'ber i,* a town in Ontario, the capital of the Sudbury district. It is in Northern Ontario, about 180 miles north of Georgian Bay, and by rail is seventy-nine miles west of North Bay and 262 miles north of Toronto. It is on the main line of the Canadian Pacific and the Algoma Eastern railways, and is on a branch, running to Sudbury Junction, of the Canadian Northern. Population in 1911, 4,150; in 1916, 6,500.

Sudbury is the heart of the greatest nickel-mining district in the world. All the activities of the town are subordinate to this one industry. It is estimated that over sixty per cent (20,000 tons) of the world's annual output of nickel comes from the Sudbury district. The town has a number of fine buildings, including the $150,000 post office, erected in 1915; and the Nickel Range Hotel, built in the same year for the same cost. A large flour mill was built in 1910 at a cost of $750,000. Sudbury was settled in 1884 and was named for Sudbury, England. In 1896 it acquired ownership of the electric light and water plants.

SUDERMANN, *zoo'der mahn,* HERMANN (1857-), a dramatist and novelist, born at Matzsicken, Prussia. He was educated in the public schools of Elbing and Tilsit, Prussia, and in the University of Königsberg, Germany, where he made a close study of history, literature and philosophy. For a short time he was a private teacher in Berlin, but in 1881 he became editor of a newspaper in that city and three years later began to devote his entire time to writing plays and fiction.

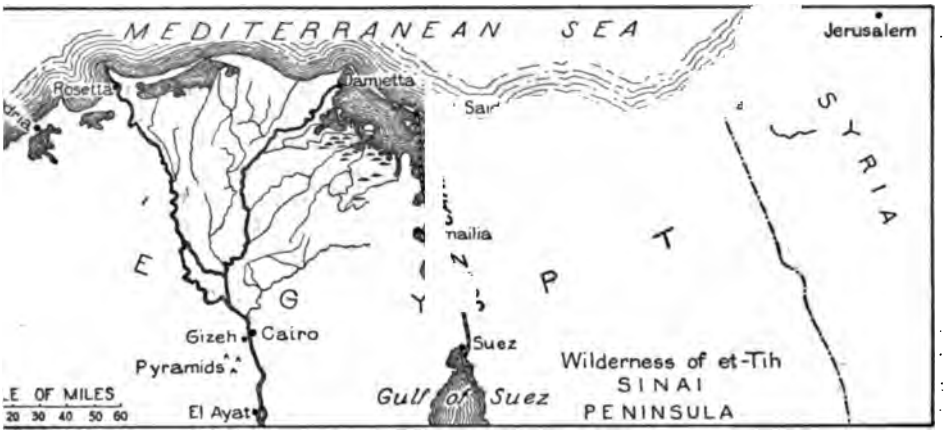
His earlier novels, *Dame Care* and *Regina,* attracted very little attention, but in 1889 he sprang into national fame with his drama of German life, *Ehre.* It pleased the German people because it presented a true and powerful picture of the class or caste distinctions in their home land, while to foreigners it appealed as a stirring and skilfully written play. Two gloomy but truthful tragedies, *The End of Sodom* and *Magda,* followed, dealing with the strained, artificial life of the modern city. The last-named play has been presented in nearly every country of Europe and has met with success in America. Among other dramas that have made an international impression should be mentioned *Morituri, The Fires of St. John, The Joy of Living* and *Stone upon Stone.* Doubtless his most powerful novel is *It Was.*

main ideas through all the work of mann are the unnecessary strain, nervous- and violence of modern civilization, the ness of many of the so-called moral rules d down from previous generations, and ght of every human being to a happiness shall not be hampered by artificial con- nality. He uses these theories over and often with gloom and bitterness, but without absolute truthfulness. As an un- g investigator of modern social life he w equals.

E, MARIE JOSEPH EUGÈNE (1804-1859), a h novelist, born at Paris. His father, who famous physician in Napoleon's army, im a large fortune, and after some study dicine in his native city and practice of it French army, Sue settled in Paris to de- his time to writing. He had been on the great deal both as a boy and as a physi- and used his knowledge of ocean animals lants in such weird romances as *The Sala- er* and *Kernock, the Pirate.* These books red during the days of the romantic ment in French literature.

y were followed by novels dealing with ysterious and the supernatural, with oc- ally a touch of socialism, which was then g favor. Among the most noted of these s were *The Mysteries of Paris* and *The 'ering Jew,* which showed extraordinary nation and ability to impress upon the r the idea of the horrible and uncanny. plots, however, are very loosely con- ed, and the style is often careless. The defect has been corrected in translations, lue is therefore still widely read and ad- outside of France.

SUEZ, *soo ez'*, a town in Egypt situated two miles north of Port Ibrahim, the harbor at the entrance to the Suez Canal. It is seventy-six miles east of Cairo, with which it is connected by rail, and is a seaport and coaling station. Formerly Suez was a prosperous trade center for the Orient, but notwithstanding improvements and increase of population since the opening of the canal it has remained unattractive and dreary. Only a small part of the vast commerce on the canal affects it. The original town has several mosques, and the houses are built of sun-dried bricks. Modern buildings, however, are found in the newer European section. The surrounding country is a desert. The exports are chiefly goods in transit. Population, about 18,000.



THE SUEZ CANAL AND COUNTRY EAST AND WEST

SUEZ CANAL, the longest ship canal of the world, extending in a north-and-south direction across the Isthmus of Suez in Egypt, connecting the Mediterranean and Red Seas. From Port Said on the Mediterranean, it extends to Suez on the Gulf of Suez, a distance of ninety-eight miles, twenty-one miles of which consists of small lakes. Its construction, shortening the route between England and India by 5,000 miles, has restored the Mediterranean to its ancient place as the most important highway of European and Asiatic trade.

This canal, built without locks, therefore known as a sea-level type, was first conceived by Napoleon when he occupied the town of Suez in 1798. A concession to build this canal was granted to Count Ferdinand de Lesseps, of France, in 1850, and work was begun April 25, 1859, the canal being opened for traffic ten years later, on November 9, 1869. Because of the large increase in traffic since its

construction, it has been widened forty-two feet and considerably deepened. Side basins are maintained to facilitate the passage of ships and in 1887 the waterway was lighted by electricity. Its cost of $90,000,000 is less than one-third of the cost of the Panama Canal, which is a lock canal, in which the water is raised nearly ninety feet. The management of the Suez Canal is directed by an international committee, and passage is given to ships of all nations on equal terms. Through the canal pass about 4,000 ships, which pay $25,000,000 in tolls in average years.

Being of such vast importance to English trade, the Suez became one of Germany's points of attack in the War of the Nations. During the year 1915, German troops penetrated Egypt a short distance west of the canal. They were unsuccessful, however, in an attack upon the city of Suez, which continued to be held by the English, or upon the canal itself. See LESSEPS, FERDINAND DE; CANAL.

Consult Nourse's *The Maritime Canal of Suez.*

SUFFRAGE, *suf'rayj,* is the right to representation and participation in government affairs, through the medium of the ballot. The general idea of representation may be traced to the origin of the jury system, far back in the history of England. One of the great problems of the centuries in all countries where the betterment of the people has been sought has centered around the effort to have all classes fairly represented in government.

In the United States. During the early years of the United States, even with the broad principles contained in the Declaration of Independence, less than one-fourth of the men of the country were given the suffrage. There were religious and property qualifications and class distinctions. For many years Baptists, Quakers, Jews and Roman Catholics could not vote, but gradually the religious qualifications were removed. Later, property qualifications became unnecessary and class distinctions were forgotten. The United States Constitution has always recognized the right of each state to decide who should have the right to vote, even for officers representing the national government, only specifying that no citizen should be denied the right of franchise on account of "race, color, or previous condition of servitude."

The attainment of the twenty-first year of age is a qualification in every state. Universal manhood suffrage, which means the right of every adult male to vote, exists in every state except in a few where, for local reasons, special educational and property tests are required. In nearly half the states women may vote on school matters, and in several they have full suffrage rights.

Related Subjects. The following topics may be consulted in connection with this article on suffrage:

Australian Ballot
Ballot
Election
Short Ballot
Woman Suffrage

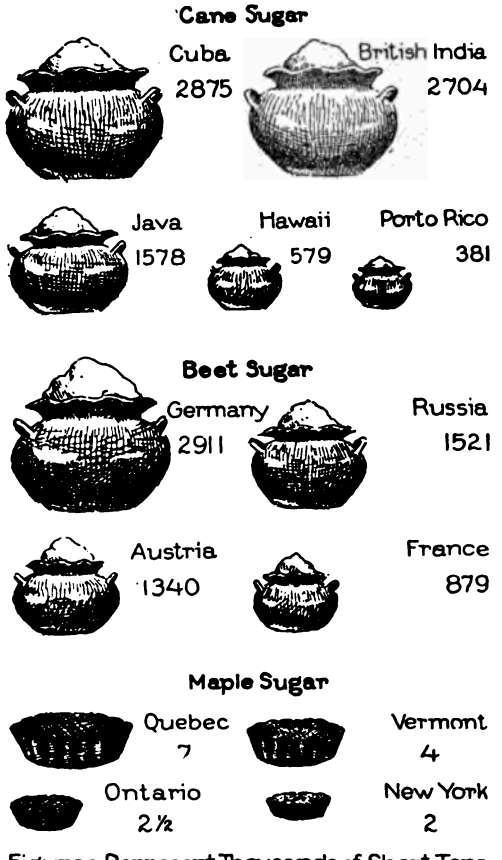
SUGAR, one of the most important foods known. It helps to form fat in the body, and is a source of energy and heat. It adds to the attractiveness of many other foods when employed as a sweetening, and if used in moderation makes them more digestible. The most common form—the lump or granulated sugar that appears on the table at every meal—is produced by extraction from sugar cane or sugar beets. Such sugar has a fuel value of 1,860 calories per pound, and is 100 per cent carbohydrate. Maple sugar is made from the sap of the sugar maple, and contains 83 per cent carbohydrates, 16 per cent water and 1 per cent ash. Grapes and the date palm are also sources of sugar, but they bear no comparison with sugar cane and sugar beets in respect to commercial importance. For a description of the sugar cane plant see the article following, SUGAR CANE.

Cane Sugar. This is the product of a complicated milling process. The cane, after being washed and cut into short lengths, or shredded, is fed into a machine equipped with

ponderous rollers from eighteen to seventy-two inches in length, which squeeze the juice from the stock. Sometimes two or three sets of rollers are used, the pressure being increased from set to set. By this process from ninety to ninety-five per cent of the sugar in the cane is extracted. As the sugar passes from mill to mill, water at varying temperatures is sprayed upon it from a perforated pipe. The water assists in the grinding or macerating process and increases the amount of sugar extracted. The crushed cane, called *bagasse* (*ba gas'*), is utilized as fuel to provide steam for carrying on the operations. The juice then undergoes purification, which is accomplished by applying chemicals and by heating and filtering. Sulphur dioxide, which is used to bleach and disinfect the juice, further enables it to take up more lime—the most important chemical employed in manufacturing sugar. As soon as cane juice is squeezed from the cells of the stock, chemical inversion begins, that is, separation into fruit sugar and grape sugar. This injurious process is arrested by the addition of lime.

To produce the first sugars the purified juice is reduced to a syrup in evaporators and then boiled in open pans containing steam coils or in vacuum pans until the water is driven off and sugar crystals are formed. The resulting mass of crystals and syrup, called *massecuite,* is then carried to a mixing machine provided with revolving paddles, in which it is thoroughly stirred. From the mixer it is fed to revolving cylinders called *centrifugals,* in which the liquid portion is forced out through the meshes of a copper gauze basket. This liquid, after being boiled and reboiled, becomes the molasses of commerce. The sugar crystals must be further refined and clarified before ready for the market. Granulated sugar is formed in a revolving cylinder heated by steam, and loaf sugar is made by packing the fresh sugar in molds. The resulting blocks are then cut to the desired size and shape. Cheaper grades of sugar, known as *coffee* and *brown* sugar, are made from syrup yielded by first sugar.

Beet Sugar. Sugar was first extracted from the beet by a German scientist in 1747, but the industry was not developed until the nineteenth century. The beets, on reaching the factory, are first washed and conveyed to slicing machines, where they are cut by triangular knives into slices not unlike "shoe-string" potatoes. These slices drop through an upright chute into a diffusion battery, consisting of a series of tall cylinders holding from two to six tons each. These cylinders are known as *cells.* Warm water is run through the cylinders, passing from one to another throughout the battery, and drawing the sugar from the cells of the beets as it goes. This "diffusion juice," as it is called, contains from twelve to fifteen per cent of sugar. The pulp left over from this process is fed to stock. The raw juice is next purified by being mixed with lime and treated with carbonic acid gas. The purified juice is then carried to the evaporators, where heat is applied through steam coils. Having passed through the evaporators, usually four in number, the thickened juice is conveyed to vacuum pans and heated until crystals form. It is then treated in the mixer and the centrifugal machine like cane sugar. In America most beet-sugar manufacturers prepare their own raw sugar for the market by putting it through a



SUGAR PRODUCTION

The source of the greater proportion of three kinds of sugar.

refining process. When it is highly refined it cannot be distinguished from cane sugar.

Production. Though sugar production was affected by unprecented war conditions, the world's output of cane sugar in 1916 was estimated to be 11,410,260 tons, and that of beet sugar 6,135,000 tons. The European output of beet sugar was 5,275,000 tons, as compared with 846,000 for the United States and 14,000 for Canada. Louisiana is the leading cane-sugar state in the Union; the total output for the country in 1916 was 253,000 tons. For the yield in other countries see chart, page 5615.

Maple Sugar. The extraction of the sap of the sugar maple is a process that begins with the tapping of the trees in the late winter or early spring. A hole about an inch and a half deep is bored into the trunk, and into this hole

A TEST FOR PURITY

Pure sugar, when dissolved in water, should be so transparent that small type can easily be read through it.

is driven a metal or wooden trough with a bucket on the end to receive the sap. Each day the sap is collected and taken to the sugar house, where it is boiled until the water content has been drawn off. This process may take place in an ordinary kettle or in a modern steam-heated evaporator. The resulting syrup has so high a degree of purity that little clarification is necessary. Some of the syrup is poured into molds and left to harden into sugar. The black, silver and red maples and the box elder are all sources of maple sugar, but the greatest supply comes from the sugar maple. In the United States Vermont and New York are the leading maple-sugar states, but neither produces so much as the Canadian province of Quebec, see chart. The total annual output for the United States is about 14,000,000 pounds of sugar and 4,100,000 gallons of syrup.

A Booklet on Sugar

Cover—In center, title, *The Story of Sugar*; at bottom, name of pupil, grade and school.

Illustrations: In lower left corner, sugar cane; in upper right corner, group of maple leaves.

Inside cover—Blank.

Page one—Essay, *Making Cane Sugar.*

Illustrations: Broken cane stalks; cubes of loaf sugar.

Page two—Essay, *Making Beet Sugar.*

Illustration: Heap of sugar beets.

Pages three and four—An original story, *When We Made Maple Sugar.*

Illustrations: Sugar maple; fire with kettle hanging above it.

Page five—Essay, *Where Sugar Is Produced.*

Illustration: Shaded maps.

Page six—Description of an experiment in crystallizing sugar (see article CRYSTALLIZATION).

Illustration: Drawing showing shape of crystals.

Page seven—Essay, *Uses of Sugar.*

Illustration: Sketches of various foods into which sugar enters largely.

Page eight—*My Favorite Candy Recipe.*

Inside back cover—Blank.

Back cover—List of all plants from which sugar is made.

Consult Geerligs's *Practical White Sugar Manufacture*; Kippenhaan's *Evaporation in the Cane and Beet Sugar Factory*; "Statistics of Sugar in the United States and Its Insular Possessions," in *United States Department of Agriculture Bulletin No. 8*.

Related Subjects. The reader is referred to the following articles in these volumes:

Carbohydrates	Maple
Food subhead	Molasses
Chemistry of Food	Vacuum Pan

SUGAR CANE, a giant perennial grass cultivated in tropical and semitropical countries, the source of about half the sugar of commerce. Sugar cane gives off from a thick, solid root-stock, numerous erect stems that grow from ten to fifteen feet in height and are from an inch to two inches in diameter. The stalk has at its top tufts of bears, in the upper portion, several long and narrow leaves which are arranged in two rows. The stalk is divided into numerous short sections, sometimes sixty to eighty in number, which are connected by

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SUGAR INDUSTRY.

Planting sugar cane in Peru, and a cane harvest in the same country. Below: Cane field in Porto Rico.

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SUGAR INDUSTRY. At top: Sending cane to mill in a flume, in Hawaii. Bottom: Left, cane grinding in Jamaica; right, women field laborers, Jamaica.

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BEET SUGAR. Above: Evaporators where the juice is boiled to a syrup. Below: Centrifugals, where crystallized sugar is separated from the syrup by whirling.

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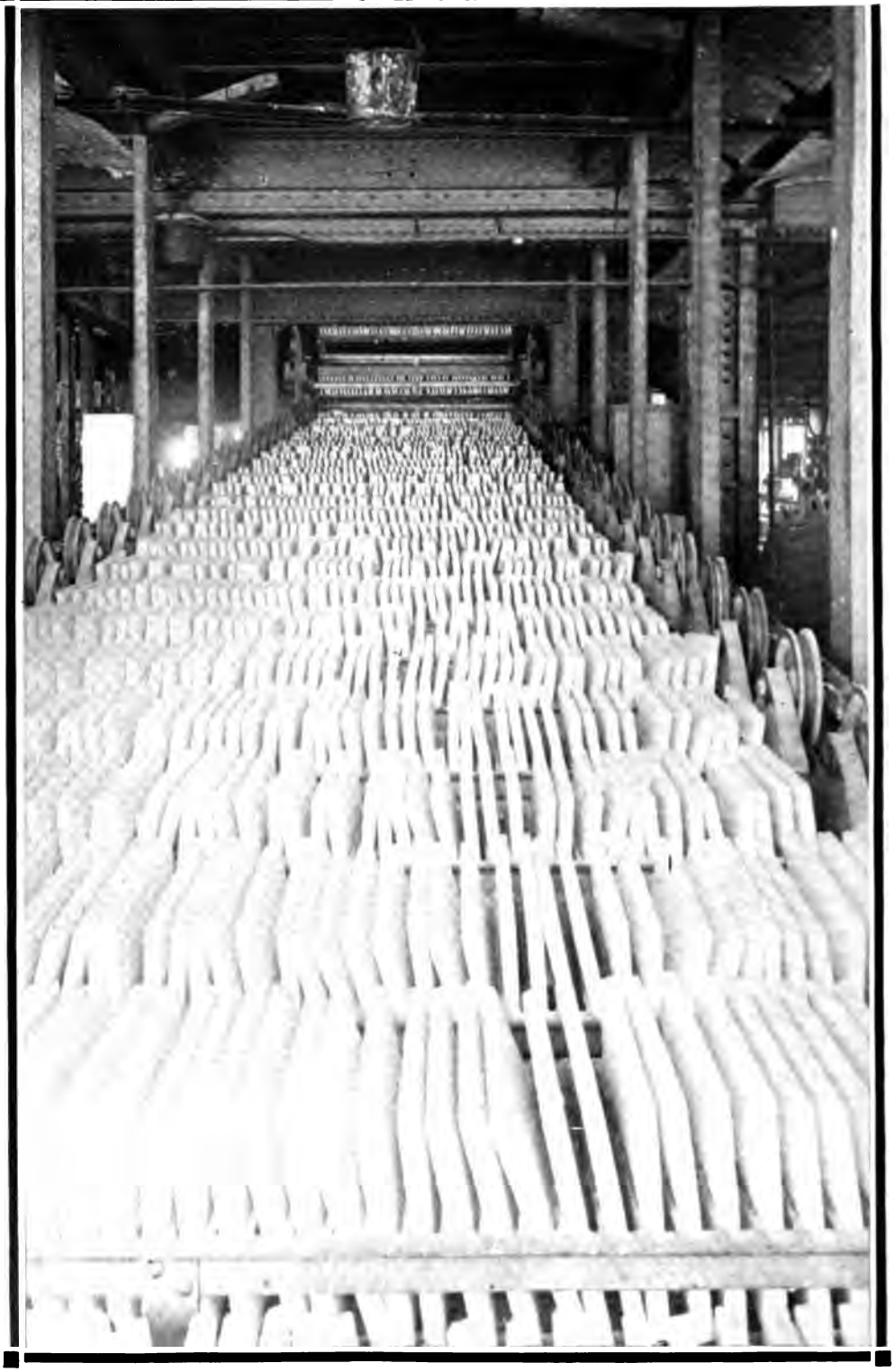


MAKING LOAF SUGAR.

Moving drying ovens in a New Jersey refinery.

, the sections between being known as
iodes. Each node bears a small bud that
very much like the eye of a potato. The
of the stem varies for different kinds of
some being yellow, others reddish, and
thers green- and white-striped. Sugar cane
s only in tropical countries, but even
some varieties never blossom. The chief
-cane regions in the world are British In-
he West and East Indies, the Hawaiian
ls and Louisiana.

wth and Cultivation. The soils best
ed to the growing of cane are those that
a high degree of fertility and that are
capable of retaining a large amount of
ure. This plant requires an abundance of
, and if the rainfall is not adequate, ex-
t results are obtained by irrigation. A
subsoil of clay is of value in preventing
ashing away of soluble plant food, espe-
where a considerable amount of irrigating
orted to. The alluvial soil of Louisiana
aining deposits of mud, sand and gravel)
splendid crops of cane, but there drain-
very important, in fact, almost essential.
oils of the Hawaiian Islands, which yield
eaviest crops of sugar cane in the world,
ch in lime, potash, phosphoric acid and
en.

ar cane is propagated for the most part
em cuttings; seed is used principally for
fertilization and to produce new varieties,
ot all varieties of cane bear fertile seeds.
ing may take place either in the spring
l, the latter when the spring and summer
is are so short that spring planting might
ger maturing of the crop. If planted in
ll the canes come up earlier, and earlier
ng is possible. A field prepared for plant-
as great furrows, from five to seven feet
running from one end of the field to the

In these the cuttings are laid horizon-
sometimes singly and often two or three
st. Some planters use only the upper
n of the cane for planting, some the en-
ne. Others recommend planting only the
ed portion. The upper portion is con-
d best for seed.

er the cuttings have been planted, soil is
n over the furrows until the cane is cov-

In a short time the buds borne on the
swell and burst, and a young stalk of
emerges from the soil. Soon the leaves
to appear, and in a few weeks the nodes
internodes may be seen. Cultivation
l begin as soon as the cane has a good
start, for the field must be kept free from weeds and grass. The upper part of the soil should be tilled frequently, and two or three hoeings are also beneficial. The cane grows rapidly under favorable conditions.

Harvesting. In the United States the harvesting period is from October to January (for spring-planted cane); in tropical countries, from January to the middle of summer. Though cane-cutting machines are in use to some extent, they give less satisfactory results than hand cutting. On large plantations scores of cutters are employed, each of whom is provided with a large steel knife carrying a blade five inches wide and eighteen inches long, and having on the back a small hook. As the cutters work their way down the long rows, they cut the cane close to the ground, stripping off the leaves with the hook, and topping the stalks at the last matured joint. The cut stalks are thrown into heaps called windrows, then gathered up into carts to be carried to the sugar factory. The stubble left in the field will produce a second or third crop in Louisiana, and from five to ten crops in tropical countries. Annual or biennial planting, however, gives the most satisfactory results. G.B.D.

For description of the process of extracting sugar from the cane, see the article SUGAR, where there is also an illustration of growing sugar cane. Consult Jones and Scard's *Manufacture of Cane Sugar.*

SUGGESTION, *sug jes'chun,* the influencing of conduct by presenting a pattern for imitation, or indirectly inviting a desired and natural reaction. It commonly carries the implication that the process is introduced unawares, without arousing the consciousness of the "suggested" person in the direction of the suggested response. The mechanism by which yawning is contagious is rather obvious; the sight of another yawning intensifies or releases slight tendencies in the same direction; the sight of others eating makes one hungry. When a lecturer, to illustrate the point, moves his hands open and shut, like a pair of jaws, and induces a yawn among the more responsive of his audience, the mechanism is a little more indirect.

The mechanism of suggestion in the way of inducing belief is equally important. This appears realistically in the psychology of *conjuring* (which see). When all the movements of throwing a ball into the air are performed the spectator is convinced by the suggestion of the appearance that he saw the ball in the air

(when actually it was dropped under a table), or, again, the spectator is convinced that coins are dropped into a hat by the tossing movements of the right hand (which is quite empty), when really the coin is dropped from the left hand which holds the hat. The illusion—as is true of many illusions—is the result of suggestion. Similarly, an inference is drawn from a set of premises suggestively arranged; as in the methods of a criminal in establishing an alibi or covering up his tracks.

Suggestion refers also to the process of inducing consent without arousing opposition. Children must be guided by suggestion as often as by command. As soon as the will realizes that it is being led, it asserts its self-direction; suggestibility is a ready acquiescence, a will that yields easily to another's direction. It is along the same lines that an undesirable belief or a symptom is removed by suggestion; a sugar pill may be given as medicine with the suggestion that it will have a desired effect, and the effect follows; a mock operation may be gone through with and the patient, convinced of a cure, finds himself rid of the trouble.

Suggestion as a procedure enters into the psychology of many practices (see FAITH CURE; HYPNOTISM). Normal suggestibility has its limits; it must as a rule proceed cautiously and indirectly; abnormally it attains almost incredible proportions and may proceed openly and forcibly. The psychology of persuasion (as an example, Antony's oration over the body of Caesar) and the psychology of advertising must likewise study the subtler suggestive tendencies of the mind that influence action. J.J.

Relating to Various Beliefs. The articles on the following topics, while not bearing on the subject of suggestion, are of interest in this connection:

Alchemy	Occult
Astrology	Palmistry
Clairvoyance	Phrenology
Conjuring	Physiognomy
Demonology	Psychical Research
Divination	Psycho-Analysis
Faith Cure	Spiritualism
Hypnotism	Subconscious
Magic	Superstition
Medium	Telepathy
Mesmerism	Theosophy
Mind Reading	Trance
Necromancy	Witchcraft

SUICIDE, *su'i side,* intentional death by one's own hand. Attempts have been made to show that the tendency toward suicide is an accompaniment of civilization—that a savage never takes his own life. While the facts do not support this extreme view, it is true that it is much less common among barbarous than among civilized peoples.

Christianity has always opposed suicide, accounting it a sin; and statistics show that the deterrent effect of religion is very great. It is true that in practice the appeal of religion on this subject is not always to the highest emotions, but that it often deters through threats of punishment after death. Among Christian people, suicide is far more common with Protestants than with Catholics.

Public Records. Statistics on the subject of suicide are rather meager and unsatisfactory, for there are usually reasons for secrecy regarding the facts in a case, and many instances of suicide are not so reported. There is, however, sufficient statistical material to show certain very marked tendencies, some of which seem almost unaccountable. That there should be differences in nationalities might be expected, not only on account of climate, but on account of national divergences of temperament; and these differences are very marked. Saxony leads all other countries in relative number of suicides, and is followed by France, Switzerland, Denmark, Prussia, Belgium, Sweden, England and Wales, the United States, Norway, Scotland and Ireland in approximately the order named. The difference between the extremes is great, Saxony having about twenty times as many suicides to a unit of population as has Ireland.

Proportion of Women. The difference between the sexes is also very marked, and the proportion varies little from year to year, or in different countries, approximately three or four males committing suicide to each female. The modes chosen by men and women vary, too, men choosing hanging or cutting most frequently, while women prefer drowning or poison. As to age, there are evident certain definite tendencies. Children from five to ten have been known to commit suicide, but the number of these is small. Above the age of ten the number steadily grows, until the maximum is reached between fifty-five and sixty-five. These figures concern the aggregate—men and women together. In general, it may be said that the age at which women tend to commit suicide is much lower than that for men, pointing, doubtless, to a decided difference in cause.

Classes Most Susceptible. Other facts shown by statistics are that single people commit suicide oftener than married people; that professional classes and military men show a far

tendency toward self-destruction than laboring classes; and that the late spring rly summer months without exception nore suicides than do the remaining of the year. A curious fact is that suiems at times to become epidemic, the f example being doubtless the determinuse. Though statistics are not exact to establish such a point beyond quesseems that the propensity to commit is increased by education.

arious times laws have been passed aim to serve as deterrents from suicide, ey are not effective; one knows that if eeds in his attempt at self-destruction will be powerless. In England suicides ormerly denied Christian burial, and roperty was confiscated. In the United attempted suicide is not in general con a crime, but it ranks in some states as ıy, as does also aiding an attempt at . In New York aiding a suicide is maner in the first degree. A.MC C.

ult the Bureau of the Census of the United for American statistics; also Strahan's *and Insanity.*

'LA, LUCIUS CORNELIUS (138-78 B. C.), an general and statesman, known as FE-HE FORTUNATE), and famous as the op- of Marius. He was of patrician rank, d an excellent education, and entered ny, seeing his first military service of ı the campaigns of Marius against Ju- in Africa. Here he was very successful, as also in the wars against the Teutones mbri, which raised Marius to the height power. In 93 B. C. he was made praetor, next year went as governor to Cilicia, his return to Rome in 91 did such ex- service during the Social War that became intensely jealous of him. As a for his successes he was made consul in and intrusted with the conduct of the ainst Mithridates, an honor which Maeatly desired, and the result was a riot, by the adherents of Marius, which com- Sulla to escape from Rome to his troops npania. At the head of his legions he d to Rome and drove out Marius.

ı 87 to 83 he was engaged against dates, whom he at last forced to submit ne, and on his return found himself very ul, Marius having died during his ab- The Marian party, however, had still to hed, and this Sulla accomplished by the ing of 81 B. C.

He celebrated his victories by putting to death thousands of his enemies throughout Italy, instituting a veritable "reign of terror;" then he had himself declared dictator for an unlimited term. The laws which he promulgated were all directed toward the restoration of the powers of the Senate and the aristocratic party. In 79 B. C. he resigned, and spent his last year in retirement.

Consult Oman's *Seven Roman Statesmen;* Beesly's *The Gracchi, Marius and Sulla.*

Related Subjects. The reader may consult the following articles in this connection:

Marius, Caius
Mithridates
Patrician
Praetor
Rome, subhead *Last Century of the Republic*

SULLIVAN, *sul'i van,* SIR ARTHUR SEYMOUR (1842-1900), an English composer who won fame both in the field of light opera and in sacred music, was born in London. His father was an Irish bandmaster and music teacher of much ability, and the son so early learned the rudiments of the art that at the age of eight he could play any wind instrument. When he was twelve years old he was admitted as a singer in the Chapel Royal at London and two years later won the Mendelssohn scholarship at the Royal Academy of Music. Under this scholarship he studied in the Academy and in Leipzig Conservatory. In 1861 he returned to London, and early in the next year his music to Shakespeare's *Tempest* was played in the Crystal Palace. The occasion was a genuine triumph for him and he determined to devote most of his time to composition.

For some years he was organist at Covent Garden theater, London, and professor of composition at the Royal Academy, but after 1875 practically all his energies were devoted to collaboration with W. S. Gilbert in the production of their famous light operas. He died suddenly of heart failure in London on November 22, 1900, and was buried amidst remarkable demonstrations of national sorrow in Saint Paul's Cathedral.

Sullivan accomplished the unusual feat of producing artistic music which was genuinely popular with the masses of the people. His earlier works, such as the *Kenilworth Cantata,* with its beautiful duet, *How Sweet the Moonlight,* and the songs from Shakespeare such as *Oh, Mistress Mine* and *The Willow Song,* are universally admired, while the operas written with Gilbert, such as *H. M. S. Pinafore, Pirates of Penzance, The Mikado* and *The Rose of*

Persia, became known around the world. It should not be forgotten that Sullivan also composed sacred music of an unusually high standard. His *Te Deum, The Light of the World, The Golden Legend,* and his hymn, *Onward, Christian Soldiers,* are among the most notable specimens. His *Lost Chord* has been declared one of the most successful songs of the nineteenth century. R.D.M.

SULPHATES, *sul'fayts,* are salts of sulphuric acid. As a rule they are stable crystalline compounds, more or less soluble in water, with the exception of barium, strontium and lead sulphates. These salts are very important. The following minerals—heavy spar, gypsum, celestine and epsom salts—are sulphates of barium, calcium, strontium and magnesium, respectively. Copper sulphate, or blue vitriol, is used in a variety of industries, including dyeing and calico printing; iron sulphate is used in making ink and as a medicine; manganese sulphate is employed in calico printing; zinc sulphate in surgery, in calico printing and in drying oils for varnishes. A double sulphate of potassium and aluminum, known as alum, is a constituent of some baking powders.

Related Subjects. The following articles in these volumes should be read in connection with this subject:

Alum
Barium
Blue Vitriol
Calcium
Epsom Salts
Gypsum
Magnesium
Strontium
Sulphuric Acid

SULPHUR, *sul'fur,* a substance that is found in abundance in nature and used in modern industry in the manufacture of a great number of important products. It occurs either in a pure state, or in combination with other substances, mostly metals, with which it forms valuable metallic ores, such as pyrite, which is a sulphide of iron; galena, which is a sulphide of lead; cinnabar, which is a sulphide of mercury; and barite, which is a sulphide of barium. In a pure state it occurs in great abundance in the neighborhood of volcanoes, both active and extinct. It has therefore been known from the earliest ages, and on account of the low temperature at which it burns it is called *brimstone.* Sulphur frequently occurs in a pure state in beds of gypsum or clay, which is itself a sulphate of calcium.

Eggs and several vegetables, such as onions, garlic, horse-radish and mustard contain sulphur. It is also one of the elements found in the human body; it is estimated that the human body contains about a quarter of a pound of it. Sulphur is also found in coal and petroleum.

Properties. Sulphur is a chemical element (symbol S; atomic weight, 32). After carbon it is the most important of the nonmetallic elements. Ordinary sulphur is a solid substance, yellow in color, almost tasteless, and when rubbed or melted it emits a peculiar odor. It is not a good conductor, either of heat or electricity. Sulphur melts at the comparatively low temperature of 230° F. It possesses the peculiar property of becoming viscous or of solidifying when heated to a higher degree. At about 480° F. the fluid is so thick that it cannot be poured from the vessel, but it becomes again fluid when the temperature is raised above that point. Sulphur boils at 792° F., emitting a yellowish-brown vapor, which condenses in closed vessels in the form of a fine, yellow powder called flowers of sulphur. The roll sulphur of commerce is made by pouring sulphur in fluid state into cylindrical molds, where it is cast.

Sulphur ignites readily at a low temperature and burns with a pale blue flame, forming sulphur dioxide, which is a colorless gas. It also combines readily with hydrogen, forming sulphureted hydrogen, and with chlorine, carbon and a great number of metals. Divided into very fine particles, it oxidizes in moist air and forms sulphuric acid. This process takes place in the atmosphere of large cities which burn a large amount of coal and gas.

Where Sulphur Is Found. Until a few years ago most of the sulphur used in commerce came from the large deposits of pure sulphur found in Sicily. To-day large quantities are extracted in the United States. The chief American source of supply is Sulphur, in Calcasieu Parish, Louisiana, where the sulphur is extracted from the deep-lying beds by an ingenious process. Sulphur is also obtained in small quantities in Texas, Wyoming and Nevada. The production of sulphur in the United States amounts to about 350,000 tons a year; in 1900 it was 3,147 tons. Deposits are also found in Chile, Peru, New Zealand, Japan and some parts of Asiatic Russia.

Its Uses. Sulphur finds a great number of uses in modern industry, chief among them being the manufacture of sulphuric acid, gunpowder, matches, fireworks and in vulcanizing rubber. It is also used in medicine, and its compounds are utilized in the manufacture of a great number of products. O.B.

SULPHURETED HYDROGEN, *sul ju ret'ed hi'dro jen,* or **HYDROGEN SULPHIDE,** *sul' fide,* a poisonous gas with the odor of rotten eggs, is a compound of sulphur and hydrogen. It occurs in mineral waters, and wherever organic compounds containing sulphur are decomposed, as in the air about cesspools and sewers. It is made in the laboratory by the action of hydrochloric acid on iron sulphide. The gas burns with a bluish flame, is colorless and has a sweet taste, and is soluble in water. The solution reddens litmus, and when it decomposes it deposits sulphur. Sulphureted hydrogen is a strong reducing agent, and is useful in the manufacture of anilines. Dissolved in mineral waters, it has medicinal properties in rheumatism and skin diseases. The chemical formula for hydrogen sulphide is H_2S.

SULPHURIC ACID, *sul ju'rik as'id,* or **OIL OF VITRIOL,** *vit'ri ul,* an oily liquid manufactured in great quantities for use in numerous industries. This acid is indispensable in the manufacture of artificial fertilizers, alum, nitroglycerine, glucose, phosphorus and dyestuffs, and in the bleaching, electroplating, oil refining and mining industries. It is employed in the making of sodium carbonate (soda), which in turn is used in manufacturing soap and glass, and is an essential factor in the production of all other mineral acids. The manufacture of sulphuric acid is based upon the fact that it is formed when sulphur dioxide, the common compound of sulphur and oxygen, oxidizes in the presence of water.

The acid is a combination of hydrogen, sulphur and oxygen, its chemical formula being H_2SO_4. When pure it is colorless and odorless. It has great affinity for water, which it absorbs quickly from many organic substances. For this reason it makes painful wounds if it touches flesh. It chars wood, paper, starch and sugar, and is often employed in the laboratory to dry gases, for it absorbs moisture from the air and from gases passed through it. Four parts of acid to one part of water raises the temperature of the water to boiling, and if the two are mixed the acid should be poured into the water, not vice versa; otherwise the containing vessel may be cracked by the sudden access of heat. The acid is supposed to have been known to Arabian alchemists of the tenth century. In the fifteenth century a German chemist, Basil Valentine, described its preparation. It was then known as oil of vitriol, as it was made by heating a mixture of green vitriol and sand.

SUL'TAN, an Arabic title of honor, used since about A.D. 990 and applied to Mohammedan princes and rulers. The word means *emperor* in the modern sense, but more anciently referred rather generally to one who was mighty or imperious. The sultan of greatest dignity is the ruler of Turkey, and to set him apart as greater than any other bearing the title he is officially known as *sultan khan,* or *reigning sultan.* The form *sultana* is applied to the mother, wife, or daughter of the sultan.

SULTE, *suhlt,* BENJAMIN (1841-), a Canadian poet and historian, author of the *Histoire des Canadiens-Français* (History of the French-Canadians), a standard in its field. Sulte was born at Three Rivers, Que. After the early death of his father he left school and had to work for a living. He drifted through various employments until he finally entered the service of the Dominion government as a translator. He was in the government service for thirty-five years. In addition to the solid eight-volume *History of the French-Canadians,* Sulte wrote a *Histoire de St. François du Lac* (History of Saint Francis of the Lake), a history of Quebec and two volumes of verse, *Les Laurentiennes* and *Les Chants Nouveaux* (New Songs). Much of his work has appeared in journals and periodicals.

SU'LU ISLANDS, an archipelago consisting of more than 190 islands, lying between the Celebes and the Sulu seas, off the northeast coast of Borneo (see colored map, with article OCEANIA). They are the most southerly group of the Philippines, and have a combined area of about 1,560 square miles. The natives are chiefly Moros. For governmental purposes the Sulu Islands constitute a district of the Filipino province of Moro. The islands produce a great quantity of valuable wood, including teak, sandalwood, bamboo and palms. Rice, cocoa, maize, bananas, oranges and mangoes are cultivated, and there is an extensive trade in pearl shells. Oxen, swine, goats and poultry are abundant, and wild boars and deer are common.

SUMAC, or **SUMACH,** *su'mak,* a group of small trees or shrubs of temperate regions, consisting of about 120 species, many of which are commercially important. Of the North American sumacs one of the best known is the *staghorn,* whose range is from Southern Canada to Georgia and Mississippi. It is an attractive flat-topped tree, growing thirty or thirty-five feet high and bearing fernlike leaves, small, greenish flowers and tiny red berries. In the autumn

the foliage of this sumac is a wonderful combination of flaming scarlet, orange and purple, but the summer leaf is velvety, dark-green above and pale beneath. The branches of the tree are forked many times, and before it is mature they are covered with a soft, velvety down. The fruit clusters and leafstalks are extremely hairy. From the soft, brittle wood are made walking sticks and inlay work for boxes and ornamental objects. Not less attractive than the staghorn is the *dwarf, black* or *mountain* sumac, found all over the Eastern United States and beyond the Mississippi River west to the Rockies. In the Tennessee and North Carolina mountains it grows as tall as the staghorn, but is usually a shrub. As its leaves are rich in tannin they are employed in tanning leather, and from them is extracted a yellow dyestuff.

A sumac bearing white berries is found in swampy land from New England to Minnesota and from Georgia to Texas. This is the *poison* sumac, which all people should avoid. Like its harmless relatives, it is a tree of beautiful foliage, but can always be recognized by its fruit, which hangs in drooping clusters. The red berries of the harmless sumacs are in dense, erect clusters. The *smooth-leaved* sumac, which usually grows only three feet high, is a species found east of the Rocky Mountains, from Arizona to British Columbia. The unripe summer berries are used in making a refreshing drink, and the bark, leaves and fruit are used in treating fevers.

Among the sumacs of the eastern hemisphere are the *Venetian,* a plant used in Italy for tanning; the *elm-leaved,* whose fruit is valued as a condiment; the *Japan varnish tree,* which yields a varnish used in lacquer work, and a seed oil employed in making candles; and an Australian species whose wood is much valued by furniture makers. M.K.

SUMATRA, *soo mah'tra,* the second largest island of the Sunda group, in the Indian Ocean, one of those rich Oriental lands which contribute their wealth to European owners and rulers. In this instance the proprietor is the Netherlands. (See map, accompanying article Asia or article Oceania.) Lying across the equator, southwest of the Malayan peninsula, having an area of 180,000 square miles, Sumatra resembles California in shape and is about 20,000 square miles larger than that American state. However, Sumatra's population, which is 4,029,000, of which number less than one per cent are Europeans, is about double that of California. The mountains are rich in minerals; the forests furnish teakwood, bamboo and valuable gums; in the fertile valleys grow the pepper and tobacco of Sumatra's important European and Chinese trade.

Inhabited by several different savage tribes of Malayan and Hindu origin, one of which, the Kubu, is the most uncivilized tribe known, the island has presented many governmental difficulties to the Dutch, who have held Sumatra as a colony since 1600. Europe first heard of Sumatra through a Portuguese explorer in 1508, and the first European trading posts on the island belonged to Portugal. In the seventeenth century the British founded a colony on the southwest coast, but after a long period of rivalry with the Dutch, they withdrew in 1824.

The Dutch governor-general, assisted by a council and the resident governors of the various districts, has absolute authority; except that he is responsible to the home government. The natives take little part in governmental and commercial affairs, and are chiefly occupied in cultivating the soil, raising cattle, fishing and in gathering the riches of the forests for white men.

There are few large cities; the most important of these are Palembang, in the southeast, and Bencoolen and Padang, on the west coast. Dutch engineers have built highways connecting the east and west coasts, military roads and two railroad lines from Padang. E.B.P.

Consult Cabaton's *Java, Sumatra and the Other Islands of the Dutch East Indies.*

SUMMERLAND, *sum'er land,* a town in Southern British Columbia. It is prettily situated on the west shore of Okanagan Lake, ten miles by steamer north of Penticton, which is at the foot of the lake. At Penticton connection is made with the Kettle Valley Railway, and at Okanagan Landing, ninety-four miles north of Summerland by steamer, with a Canadian Pacific branch which runs to the main line at Sicamous. Population in 1916, about 2,000.

Like Penticton and other towns in the Okanagan Valley, Summerland is a large fruit-producing center, especially for peaches. Mixed farming and cattle raising is carried on a few miles away from the lake, but the front land is too valuable for these pursuits. Lumbering is an important industry in the vicinity, and the town makes large quantities of fruit boxes and crates. A Dominion experimental farm adjoins Summerland on the south. The electric light and water plants, as well as the irrigation

system, are owned by the municipality. Okanagan College, which was temporarily closed in 1917, is located here.

SUMMERSIDE, *sum'er side,* a town in Prince Edward Island, the county town of Prince County. It is on the south side of the island, on Northumberland Strait, and is on the Prince Edward Island Railway. The harbor is large and deep enough for ocean-going vessels. Summerside has an export trade in lobsters and oysters, the latter coming from the famous Richmond Bay fisheries, three miles away. The town is also noted as the center of the fox-raising industry on the island. Population in 1911, 2,678; in 1916, estimated, 2,800.

SUM'NER, CHARLES (1811-1874), an American statesman of the period of the War of Secession, one of the most outspoken and fearless of the antislavery leaders. Lincoln spoke of him as "my idea of a bishop," because he so courageously denounced whatever he thought to be wrong. Sumner was born in Boston. After completing a course at the Harvard Law School he was admitted to the bar (1834). Between 1837 and 1840 he traveled in Europe, and on his return home began actively to oppose the extension of slavery. In 1851 the Free-Soil party of Massachusetts, by combining with the Democrats, brought about his election to the United States Senate, and he was a member of that body until his death.

CHARLES SUMNER
For over twenty years a Senator of the United States.

Sumner's zeal as an antislavery leader led to an assault upon his person. In 1856 he delivered a fiery speech entitled *The Crime Against Kansas,* in which he severely criticized one of the Senators from South Carolina. In retaliation a Southern congressman, Preston Brooks, attacked him with a cane while he was alone in the Senate chamber, injuring him so seriously that for three years he was unable to appear in public life. Late in 1859 he resumed his place in the Senate, and for ten years following 1861 he served as chairman of the Committee on Foreign Relations. He was an ardent worker for enfranchisement of the negro, and he approved the impeachment of Johnson.

In 1872 Sumner joined the Liberal Republicans, whose candidate for the Presidency was Horace Greeley, for he disagreed with Grant on the latter's home and foreign policies. It is especially to the credit of Sumner that he was one of the first to advocate civil service reform.

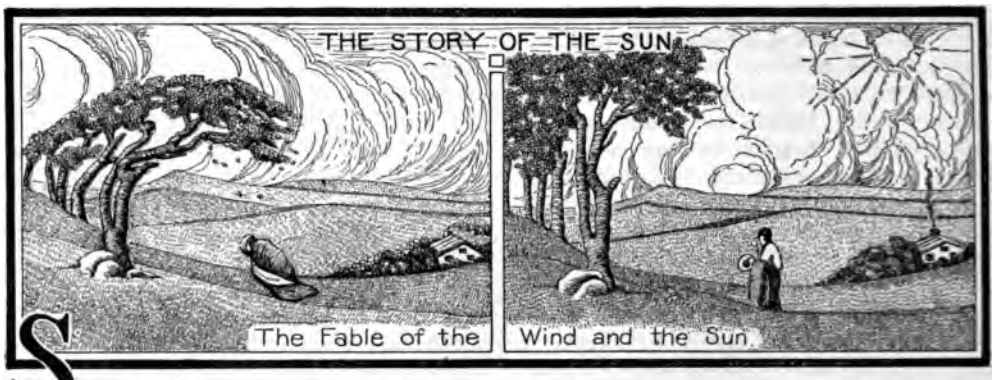
SUMPTUARY, *sump'tu a ri,* **LAWS.** The word *sumptuary,* like *sumptuous,* comes from a Latin word meaning *expense,* and sumptuary laws are regulations to limit the amount of money spent on private luxuries. Modern political economy does not consider such laws legitimate because they interfere with personal liberty; but the idea in the past was that by checking extravagance authorities could lessen poverty and crime.

The sumptuary laws of ancient Greece and Rome forbade elaborate funerals, costly banquets, and gold and silver embroidery on women's robes; at one time, indeed, there was a Roman edict punishing guests as well as hosts if the entertainment was more lavish than the laws permitted. Similar laws have been common at various times in England, France, Scotland, Spain and Italy. From the time of Edward III until the Reformation the English Parliament regulated the number of courses to a meal—two except on holidays—and the dress expenditure for each class of society. Only the very wealthy might wear silk, this restriction being intended in part to encourage woolen manufacture in England.

The nearest approach we have to-day to sumptuary laws is found in legislation covering the liquor traffic, such as license and prohibition laws. However, as their primary purpose is to protect public health and morals, they are generally considered as coming under the head of police regulations. See BLUE LAWS.

SUM'TER, FORT. See FORT SUMTER.

SUMTER, S. C., the county seat of Sumter County, is centrally located in the state, forty-three miles southeast of Columbia, the state capital, and eighty-three miles northwest of Charleston. It is on the main line and several divisions of the Atlantic Coast Line Railroad, and on the Carolina, Atlantic & Western road. Sumter is a center of cotton trade and has cotton compresses, cotton and cottonseed-oil mills and manufactories of furniture, telephones, golf sticks and other commodities. The place was settled in 1800 and became a city in 1887. In 1913 it adopted the commission form of government. The population in 1910 was 8,109; in 1916 it was 9,639 (Federal estimate). The area exceeds three square miles.



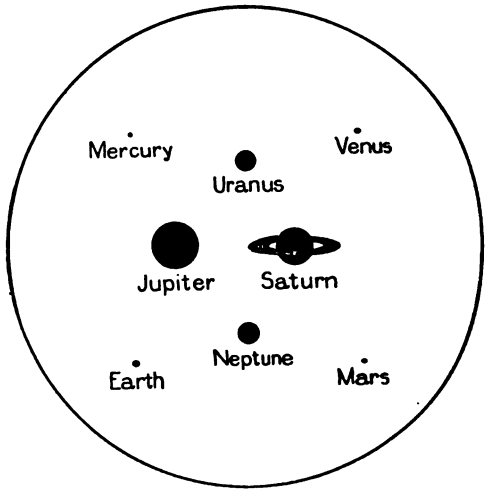
SUN, the most conspicuous of the heavenly bodies and the center of the solar system, regarded by astronomers as a star, and believed to be a gaseous mass, perhaps similar to the nebula from which the universe may have been evolved. The earth is dependent on the sun for heat and light; no form of life could exist on the planet we inhabit if the influence of the sun were withdrawn. To us on earth the sun is therefore by far the most important object in the solar system; in reality, though, it is only one of thousands of stars, and not even one of the largest. The stars are centers of their own systems.

The Sun's Surface. All that can be seen of the sun by an observer on the earth is merely its shining surface, so intensely bright that the naked eye cannot endure to look at it. Astronomers call this shining surface the *photosphere*. A cloak, or envelope, of burning hydrogen, surrounding the sun, is called the *chromosphere,* which shows red, like a burning mass, through the spectroscope. The prominences observable are vast planes of hydrogen extending up through the chromosphere, thousands of miles high, beside which the earth would be but a speck. During eclipses there may be seen a still more vast, luminous envelope, called the corona.

Size and Density. The diameter of the sun is 866,500 miles, or 109½ times that of the earth; its distance from the earth, about 93,000,000 miles. It would take fourteen years for sound to travel from the sun to the earth. If an explosion occurred on the sun and the sound could possibly travel so far we should hear the explosion fourteen years after it had happened. The sun's volume is 12,000 times and its surface area 1,300,000 times that of the earth. Its density is 1.41 times that of water, so it is much less dense than the earth, whose density is 5½ times that of water.

Gravity on the sun's surface is 27.6 times as great as on earth; a person weighing 150 pounds on earth would weigh nearly two tons on the sun, and a body falling on to the sun's surface would fall 444 feet the first second, while on the earth the fall the first second would be 16.08 feet. On the sun's surface, if it were possible to get there, a human being could not lift hand or foot, but would probably be crushed by his own weight.

Apparent Motion. To dwellers on earth the sun appears to move through the heavens. As a matter of fact, the earth moves round the sun, but we are unable to feel that motion. In the spring the sun rises a little farther north



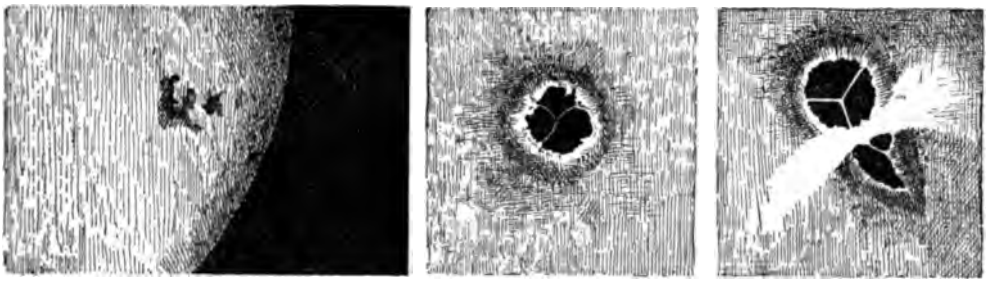
COMPARATIVE SIZES
The sun is represented by the large outer circle.

of east each day for three months in the northern hemisphere. At the summer solstice, it appears to stay at the same height for a few days, then starts on its journey southward. It not only moves north and south, but continually advances eastward among the stars, ro-

tates on its own axis in twenty-six days, and completes a circuit of the heavens in a year.

Composition and Heat of the Sun. What is behind the photosphere and the chromosphere, what the sun consists of in its interior, is still more or less a matter of conjecture. The sun apparently burns, but not in the same way that a piece of wood burns and is consumed. If the sun is cooling, the process is so gradual as never to have been in the slightest degree noted. Since the earth has been inhabited there has been time for the sun to burn itself out, but it is agreed that it still contains enough heat to supply the earth for at least 10,000,000 years. In the gaseous mass composing the sun are present iron, titanium, calcium, manganese, nickel, cobalt, chromium, barium, sodium, magnesium, copper, hydrogen, zinc, sulphur, cerium, strontium and potassium; each of these is described in its place in these volumes. The amount of heat received by the earth from the sun in a year would melt a covering of ice 124 feet thick all over the surface of the earth, and if the rays from the sun could be all concentrated on to a bridge of ice 2½ miles thick reaching from the earth to the sun, the heat would be sufficient to melt that bridge in one second. Only a very small portion of the heat radiated by the sun reaches the surface of the earth, and the portion which does reach the surface does not come direct, or it would scorch and destroy all plant and animal life. The earth is still further protected by its inclination on its axis, or the angle at which it journeys round the sun, causing the sun's rays to fall obliquely on its surface. If the same face of the earth were always turned toward the sun, one-half would be always in the light and heat, the other half in perpetual darkness and cold.

Sun Spots. The surface of the sun appears to be dotted with dark patches, irregular in shape and varying in diameter from 100 to 100,000 miles. These are called *sun spots,* and it is observed that they become more numerous at regularly recurring intervals. Although apparently dark, sun spots are only dark in comparison with the rest of the sun's surface. In reality, the light of even the darkest of sun spots far exceeds limelight in brilliance. The brightest part of an electric arc light is the nearest approach to the light of the sun, but even that is not one-quarter as bright as the solar surface. It is of course quite impossible to examine sun spots with the naked eye. Colored or smoked glass screens should be used to prevent the glare from damaging the eyes. The Carothers Observatory, Houston, Texas, suggested a practical method for observation of sun spots as follows:



SUN SPOTS, REPRODUCED FROM PHOTOGRAPHS

At left, spots seen near edge of the sun. The second illustration shows a spot, rounded at first, finally becoming bridged over with projections, as seen in the third picture.

"If images of the sun be formed through clean-cut, round holes of proper size in a darkened room, at sufficient distance from the aperture and cast upon white paper or cardboard, sun spots of ordinary size may be readily seen on the image."

This would enable amateurs to note the progress of the spots across the solar disk and to compile interesting records. By observation of sun spots which pass round the sun, the time of the sun's rotation is calculated. The spots are apparently not attached to the sun's surface but float about somewhat as clouds do in our atmosphere, causing differences in the calculated time of rotation according to the points from which spots are observed. The theory that sun spots are cavities filled with cooler gases than those in the surrounding region has been practically proved incorrect. It might be concluded that sun spots are really eruptions breaking through the photosphere.

Influence of Sun Spots. It has been clearly established that when sun spots are most numerous magnetic storms are frequent and violent on earth; it is also believed that the brilliance of the aurora borealis is directly con-

nected with the presence of an unusual number of sun spots. They are also said to influence temperature and rainfall, though no direct connection has yet been traced. Sun spots are periodic in appearance, the average period being 11.1 years, but subject to variation. During the times of the greatest number of sun spots, called the maximum, from twenty-five to fifty spots may be observed at once. Many weeks and even months may pass, however, without one being visible.

Solar Photography. In solar observation, as in all other branches of astronomy, photography has proved of the utmost value. Special appliances and lenses are, of course, necessary, the photographs being taken instantaneously. The pictures obtained are usually from two to eight or ten inches in diameter, but some of the best have been enlarged up to forty inches in diameter. In observations of sun spots photographs are particularly valuable, as they record the position and shape of the spots exactly as they were at the instant of exposure and not as they might *appear* to the human eye.

The Corona. The corona, one of the most remarkable of nature's phenomena, is visible only during the total eclipses, and then only for a very few minutes. It composes the outer envelope, crown, or halo, of the sun. The inner portion of the corona is intensely bright and dazzling, tapering in the outer corona to a soft, filmy, light with streamers spreading millions of miles into space. Astrophotography has been the means of reproducing the corona as it is, not as it might just appear for the short time it is visible.

The Sun in Literature. Literature of all ages contains strongly-phrased reference to the sun and sun worship, though poets have sung more of the moon than of the sun. Among all savage nations the sun has always been regarded as a god and worshiped with great ceremony. In the Teutonic language the sun is feminine, being spoken of as *she,* while the moon is *he.* The Bible contains many allusions to the sun; Joshua commanded the sun to stand still and the moon to stay its course (*Joshua* X, 12). Some of the kings of Judah and Israel favored the worship of the sun, as practiced by the heathen dwelling round about them (*II Kings* 23, 5 and 19). Sun worship is still adhered to in India and China and has only recently been abolished among the Indians of North America.

In the famous *Bedouin Love Song* by Bayard Taylor the following lines occur:

> Till the sun grows cold
> And the stars are old.

Byron thus addresses the sun in virile figure of speech:

> Thou material God!
> And representative of the Unknown
> Who chose thee for his shadow. Thou chief star!

An expression that has become a classic of brevity throughout the world is the practical philosophy of Cervantes, author of *Don Quixote,* who advises in homely figure to "make hay while the sun shines." F.ST.A.

Consult Giberne's *Sun, Moon and Stars;* Lockyer's *The Sun's Place in Nature;* Abbot's *The Sun.*

Related Subjects. The following articles in these volumes will give further information on the subject of the sun:

Astronomy	Precession of the Equinoxes
Corona	Satellite
Earth	Solar System
Eclipse	Solstice
Ecliptic	Star
Equinox	Sun Dance
Gravitation	Sundial
Nebular Hypothesis	Sunstroke
Planet	

SUN'BIRD, a tiny, tropical bird of Asia and Africa, with handsome plumage and long, curved bill. It keeps strictly to trees, where it seeks out larvae, spiders and insects for food. It builds an exquisite, pear-shaped or oval nest which it attaches to the end of a branch or the under part of a large leaf, often roofing over the entrance to keep out the wet. The eggs are two in number, whitish in color, with a profusion of streaks and spots. In habits and appearance the sunbird resembles the humming bird.

SUNBURY, *sun'ber i,* PA., the county seat of Northumberland County, is a borough east of the center of the state, fifty-four miles north of Harrisburg, the state capital. It is on the Susquehanna River and has transportation over the Pennsylvania and the Philadelphia & Reading railroads and electric interurban lines. Lumbering and coal mining are the supporting industries of the surrounding section, and the city has railroad shops, silk and woolen mills, dye works, planing mills and flour mills. It is the leading commercial center of the vicinity. Sunbury was founded in 1772 near Fort Augusta, which had been built in 1756 on the site of the Indian village of Shamokin. It was first incorporated as a borough in 1797. The Mary M. Packer Hospital, the courthouse and the municipal buildings are prominent features. In 1910 the population was 13,770; it was 16,200 in

1916 (Federal estimate). The area is about two square miles.

SUN'DA ISLANDS, two groups of islands in the Malay Archipelago, extending from the Malay Peninsula to the Moluccas. The Great Sunda Islands consist of Sumatra, Java, Borneo, Celebes, Banka and Belliton; the Little Sunda Islands being Bali, Lombok, Sumbawa, Flores, Sumba and Timor. With the exception of part of Borneo, they are under Dutch rule. The Sunda Strait separates Java and Sumatra, both of which suffered terrible effects from the eruption of Krakatoa in 1883. The Sunda Islands are extremely productive and carry on a large commerce in spices, fruits, copra, rice, coffee, cocoa, tobacco and sugar.

SUN DANCE, a religious ceremony once practiced by the Plains Indian tribes of North America, but now almost unknown. In most places it has been suppressed by the United States government, because of the fearful tortures that sometimes accompanied it. The ceremony was held once a year in summer or early autumn, and usually lasted eight days, the first three or four being devoted to preliminary rites. Each tribe had its special reason for organizing the dance, but it was always believed to benefit the tribe. Sometimes it was held in fulfilment of a vow made to the sun god. The members of the tribe would arrange their tepees around a central medicine lodge, with an opening toward the rising sun. In the center of the lodge was a pole, toward which the participants, who were stripped and painted, danced. The rites accompanying the ceremony were often very elaborate, and in all cases they had a special meaning.

SUN'DAY, among Christian nations the first day of the week, the day set apart for rest and public worship of the Deity. Among the old Teutonic peoples it was originally sacred to the sun, and its name has remained unchanged. Among the Latin nations, however, it became known as the Lord's Day, *dies dominicus*, from which the modern names *dimanche* (French), *domingo* (Italian), *domenica* (Spanish), etc., are derived.

In the earliest days of the Christian Era, the status of the Christians was such that they had to work every day in the week, and there is no evidence that Sunday was at first regarded as a day of general rest. It was, however, set apart for worship. About the middle of the second century the Church fathers began to discuss the question of forbidding work on Sunday, but it was not until the fourth century that Church and State officially recognized the day as a day of rest. Most of the states of the United States, the provinces of Canada, and Christian nations in all parts of the world now have laws regulating or prohibiting Sunday labor.

SUNDAY, WILLIAM ASHLEY (1863-), an evangelist and former baseball player who is known throughout the United States as "Billy" Sunday. He was born in Ames, Iowa. His father was killed in the War of Secession before William was born, and a part of his childhood was spent in a soldiers' home in Iowa. He went to high school and to Northwestern University for a time, but he never completed his college course. From 1883 until 1890 he played baseball on the Chicago, Pittsburgh and Philadelphia teams of the National League. He was a first-class player, one of the best in the United States in his time, and twenty-four years after leaving the diamond, at the end of an eleven-weeks' religious campaign in Philadelphia, he could still bat a "homer" and run the bases in sixteen seconds.

After his conversion Sunday served as assistant secretary of the Y. M. C. A. in Chicago (1891-1895). In 1903 he was ordained a Presbyterian minister, but he had begun his evangelistic work in 1896. He preaches the gospel of clean living, and has won followers by the thousands. Billy Sunday's amazing success is difficult to explain, but his methods are easy to criticize. His enemies are many; his language has been called "billingsgate;" his religious meetings have been termed "vaudeville stunts." But this is unfair. For, although his speech is slangy and crude, it is not vulgar, and there is something so vital, so human, so genuine about the man that people are irresistibly drawn to him. The religion he preaches is the sort that would appeal to the average American, for it is the simple doctrine of contentment, of living honestly, paying one's debts, of being faithful to home and family and of standing for community brotherhood and the common good.

SUNDAY SCHOOLS, or BIBLE SCHOOLS. When the international convention of Sunday Schools met at Zurich, Switzerland, in 1913, statistics for the world were compiled. It was found that there were at that time over 310,057 Sunday Schools in operation in Europe, Asia, Africa, the Americas and Oceania, and that they had a combined enrolment of over 27,000,000 pupils. (These figures do not include the 2,850,000 in Roman Catholic schools.) The

numbers given above tell a story of a wonderful development, for the Sunday School as we know it to-day is the outgrowth of a movement that began late in the eighteenth century, and is hardly older than the American republic.

It was a movement inaugurated by a benevolent publisher of Gloucester, England, named Robert Raikes (which see). Moved by the forlorn condition of the children of the poor in his town, he conceived the idea of gathering them together on Sundays and hiring women to teach them. His first so-called "Ragged School" was started in 1780. The interest shown by the children and the good accomplished more than justified the experiment, and when such workers as John Wesley and George Whitefield, and even the queen herself, gave their support to the work, the movement spread rapidly. When Raikes died, in 1811, there were about 400,000 children in Sunday Schools.

In America the Methodists began the organization of Sunday Schools on a definite plan soon after the conclusion of the Revolutionary War, and other denominations followed their example. In 1824 a voluntary union of Christian workers of different denominations was organized in Philadelphia under the name of the American Sunday School Union. Through missionary workers sent to all parts of the United States this organization has established thousands of schools, especially in rural communities, and has circulated millions of dollars' worth of Bibles, Testaments and other religious publications. An average of about four new Sunday Schools a year has been maintained by the organization since its foundation. In many cases the schools have become organized churches.

In the year 1872 American Sunday Schools of all denominations began using a uniform system of lessons, designed to complete the study of the Bible in six years. This movement became international in 1875, and in 1889 it became world-wide. The organization which publishes the lessons is known as the International Sunday School Association. In recent years the need of a graded system of lessons has been felt, and in many Sunday Schools this idea has been successfully carried out. A well-organized school is divided into different departments, each having its own superintendent. The pupils are arranged into classes according to age and mental capacities, much as in the secular schools, and each department has a course of lessons especially adapted to the pupils of that division. Other features of modern Sunday School work are classes for teachers, Sunday School workers' institutes, conventions and circulating libraries.

Religious instruction in the Roman Catholic Church is given to all children who attend the parochial schools, and those who do not attend them are required to attend Sunday classes held in the schools. A.C.

Consult Lawrence's *How to Conduct a Sunday-School;* Pattee's *Elements of Religious Pedagogy;* Brown's *Sunday School Entertainments.*

SUN'DERLAND, a seaport and coaling station of England, in Durham County, situated on the northeastern coast at the mouth of the Wear River, about fourteen miles northeast of the city of Durham and 261 miles northwest of London. Sunderland is one of the most important shipbuilding centers in the kingdom, and one of the world's great coal-shipping ports, and it has a fine harbor defended by batteries. One of the coal mines in the vicinity, the Pemberton, is 2,286 feet deep, and is reputed to be the deepest known. Among the interesting features of the town is Saint Peter's Church, which retains portions of an old seventh-century monastery, in which the Venerable Bede was a student. The industrial establishments include marine engine works, glass and pottery works and cable and rope factories. Fishing is an important occupation of many of the inhabitants. Population in 1911, 151,159.

SUNDEW, *sun'du,* a group of interesting plants found in bogs and marshes, so called because they secrete drops of sticky fluid which glitter like dew in the sunlight. The sundews belong to that class of plants which entrap and devour insects (see CARNIVOROUS PLANTS). A common American species is the *round-leaved sundew,* the leaves of which spring from the root. They are borne at the ends of slender leafstalks which radiate from the root like spokes from the hub of a wheel. The leaves are covered with stiff, short hairs, each of which ends in a knob covered with a sticky liquid. When an insect lights on one of these knobs it is liable to be held there, and then the hairs close over it and imprison it. After the captive dies its soft parts are absorbed by the leaf, which pours out a juice that digests them. The plant has a tall, slender flower stalk, on which the small, white flowers are borne in rows.

SUNDIAL, the oldest known device for measuring time. The earliest mention of it is in the Bible (*Isaiah* XXXVIII, 8):

> Behold, I will bring again the shadow of the degrees, which is gone down in the sundial of Ahaz, ten degrees backward.

The probable date of the sundial above referred to is about 700 B.C. The earliest sundial of whose construction there is certain knowledge is the dial of Berossus, a Chaldean astronomer who lived about 300 B.C. This dial was a hollow hemisphere, set with its rim horizontal and with a small bead fixed at the center. The shadow of the bead, during the sun's progress from east to west, described a circular arc. This arc was divided into twelve equal parts. The dial, as a consequence, divided the day, from sunrise to sunset, into twelve equal parts, which were called temporary hours. The length of these hours necessarily varied with the seasons.

For sixteen hundred years sundials, though built in various ways, were all based on the principle of temporary hours. About the year 1400 the introduction of clocks and other mechanical devices for measuring time made necessary the determination of *equal hours*. Just when the transition took place is uncertain, but by the end of the sixteenth century the temporary hours seem to have gone out of use. By the end of the eighteenth century the use of sundials was practically discontinued, except where they served as ornaments or were preserved as relics.

A dial is composed of two parts, the *dial face* or *plane*, and the *stile* or *gnomon*. The dial face is divided into quarters, and the dial must be set so that the dividing lines run toward the four points of the compass. The dial is further marked into hour spaces, with divisions of halves and quarters. The gnomon is a flat piece of metal, set in the center of the dial and pointing toward the North Pole. On sundials used in the southern hemisphere the gnomon must point to the South Pole. Sundials are known as horizontal, vertical or equinoctial, according as their planes are respectively in the same plane as the horizon, in a line perpendicular to that plane, or parallel to the equator. W.F.Z.

SUN'FISH. There are several kinds of fish to which this name is applied. In North America the sunfish are a group of small, bright-colored food fish, rarely over ten inches long. An interesting fact in regard to their coloration is that it changes according to conditions of health, food and temperature. The common sunfish, or sunny, is found abundantly in brooks and ponds from Maine to Florida and in the northern part of the Mississippi Valley. It has a roundish body and there is considerable orange in its coloration, so that the name given it by young anglers—"pumpkin seed"—is very appropriate. This fish is about eight inches long and weighs from six to eight ounces. Boys enjoy angling for it because it bites with so much vim. Other well-known sunfish are

THE SUNFISH
The male is guarding the typical circular nest.

the *blue spotted*, the *mud*, the *long-eared* and the *copper-nosed*.

The name sunfish is also given to a group of grotesque-appearing ocean fish which have the habit of resting on the surface in sunny weather with one fin above the water. The body is scaleless, dull colored and clumsy, that of one species seeming to consist of one great head with small fins. The young, however, look more like typical fish. Ocean sunfish are never used as food.

SUNFLOWER, *sun' flou er*, a flowering plant of the Composite family, so named because of the great flower head with its encircling rays of gorgeous, yellow petals. James Montgomery's poem to the flower contains these lines:

* * * the sunflower turns on her god, when he sets,
The same look which she turned when he rose.
—MOORE: *Believe Me, If All Those Endearing Young Charms.*

Eagle of flowers! I see thee stand,
And on the sun's noon-glory gaze;
With eye like his, thy lids expand,
And fringe their disk with golden rays.

One of the best known of several species is the annual garden sunflower, which under cul-

tivation bears flower heads a foot in diameter. These heads are flattened disks, surrounded by circles of florets. The outer circle in each case is a row of large, yellow petals which seem always to be turned toward the sun, and from it to draw their bright color. The other florets, which form row after row of concentric circles, are small, tubular flowers. The plant has a rough, hairy stem from six to ten feet high, and coarse, heart-shaped leaves. Numerous leaflike bracts surround the disk, their purpose being to protect the more delicate parts of the flower. The sunflower is cultivated for decorative purposes, and for its seeds, which are used as food for cattle and poultry. In some sections of Europe the stalks are used as fuel and the seeds are eaten as nuts.

SUN'STROKE. This term has been applied to two different ailments resulting from overheating of the body. As the remedies for these ailments are entirely different, they should be very carefully distinguished. The more serious condition is known also as *heat stroke* and *heat fever*. It usually comes on quickly. The victim has a sense of burning heat all over the body; he becomes dizzy, cannot see clearly, and grows nauseated and faint; then he falls unconscious. The skin becomes burning hot and red and there may be delirium, vomiting and diarrhoea. The temperature will rise to 108° or more, in some cases as high as 115°. Such strokes may attack persons who have not been in the sun at all, but who are shut in hot rooms where the air has become foul.

The first thing to be done with a victim of sunstroke is to cool the body, by putting the subject in a cold bath or wrapping him in cold, wet sheets. As soon as the patient regains consciousness the cold applications may be discontinued unless the skin becomes hot again. Water may be given, but under no circumstances should any stimulant be administered, as stimulants warm the body. It is always wise to call a physician, but if one cannot be found no time should be lost in getting the victim cooled. Should a boy on a fishing expedition in the woods suffer from heat stroke his companions should roll him in the river without delay.

Heat Exhaustion. This is the term which is applied to the milder ailment. In this case the pulse becomes feeble, and the patient feels exhausted and is faint, but is not necessarily prostrated. The skin, instead of becoming burning red, is white and clammy. If the attack is severe the subject will lose consciousness, and the temperature will fall below normal, perhaps to 95°. Recovery, however, is usually a matter of a short time, the chief remedies being rest and stimulation. Cold is never applied externally, except that a cold cloth may be placed on the head. Tea, coffee or aromatic spirits of ammonia should be administered, or if nothing else is at hand a small quantity of whisky or brandy in a large quantity of water. If the case is unusually bad a warm bath may be given.

Deaths from sunstroke are numerous in large cities during very hot spells, but many fatalities would be prevented if people would be more careful about eating and drinking. Excesses of any kind should be avoided, but especially indulgence in alcoholic liquors. See ALCOHOLIC DRINKS, subhead *Cause of Heat Prostrations*. C.B.B.

SUPERIOR, *soo pe'ri or*, LAKE, the largest body of fresh water in the world, and the deepest, most elevated and most northwesterly of the five Great Lakes of North America. It lies between Ontario on the north and east,

LAKE SUPERIOR

The small corner map shows the location of Superior with respect to the members of the group of Great Lakes.

Wisconsin and Michigan on the south, and Minnesota on the west. Its maximum length from east to west is 412 miles, and its greatest width is 167 miles; the area, 31,200 square miles, is a little greater than that of the state of South Carolina. Lake Superior has a maximum depth of 1,008 feet and is 602 feet above sea level. About two hundred rivers pour their waters into it, the largest of which, the Saint Louis, at the western end, is the most remote headstream of the Saint Lawrence. Isle Royale (which see), about eight miles from the international boundary between the United States and Canada, is the largest of its islands; others of importance are Saint Ignace, Grand, Manitou and the Apostle group.

Lake Superior has for the most part a bold and rocky coast line. In some places, especially on the north shore, there are steep cliffs

abruptly from the water's edge to heights
eral hundred feet; the Michigan shore is
ified by the famous sandstone walls known
: Pictured Rocks. The lake basin is a
ift in a region rich in copper, iron, nickel
ther ores. The waters of the lake are
ally pure, and they abound in whitefish,
on and trout. Because of its depth the
ever freezes over, though ice forms along
rder and in the bays.

s fresh-water lake is an important link in
eatest water highway of North America.
harges at the eastern end into Lake Hu-
r way of the Saint Mary's River. There
ifference of over twenty feet in the levels
: two lakes, and at the drop from Lake
ior to the river, where there is an impass-
series of rapids, there have been built
mous locks of the Sault Sainte Marie Ca-
One may travel by water from Duluth,
: western end of Lake Superior, to the
ic Ocean. The chief cities on the lake
uluth and Superior, Minn.; Marquette,
; Ashland, Wis., and Fort William and
rthur, Canada. See GREAT LAKES; SAULT
E MARIE CANALS.

sult Agassiz's *Lake Superior: Its Physical
cter, Vegetation and Animals.*

'ERIOR, WIS., a port of entry and the
r seat of Douglas County, is situated in
treme northwest corner of the state, 150
north and east of Saint Paul. Superior
uluth, separated only by the Saint Louis
, are the most southwesterly ports on
Superior, and together form one of the
st inland shipping points in the United
. Superior has enormous facilities for
commerce, and its railroads are the Chi-
Milwaukee & Saint Paul; the Duluth,
Shore & Atlantic; the Great Northern;
inneapolis, Saint Paul & Sault Ste. Marie
he Northern Pacific. The population,
includes a large percentage of Scandina-
and Irish, was 40,384 in 1910, and 46,226
6 (Federal estimate). The area exceeds
-six square miles.

erior is the seat of one of the state nor-
hools. Other prominent features are the
l building, completed in 1908 at a cost
5,000, the Carnegie Library and several
als. One of the chief points of interest
deep, protected harbor, which has been
ved by government, state and city ap-
ations and supplied with some of the
t coal and ore docks and grain elevators
world. A great steel bridge crosses the
river to Duluth. Superior has furniture factories, foundries and machine shops, ironworks and shipbuilding yards. Ample power for manufacture is supplied by a power plant in the river.

It is probable that the site of Superior was visited by Radisson and Grosseilliers in 1661. A trading post was established here by Sieur Du Lhut in 1680, but no permanent settlement was made until about the middle of the nineteenth century. The town was organized in 1855, and its development was promoted by several capitalists and congressmen, among whom was Stephen A. Douglas. Superior became a city in 1889. H.M.C.

SU'PERNAT'URAL. See OCCULT.

SU'PERNAT'URALISM, the belief that there is an agency above the natural in religion. It is based on man's instinct to look to a power higher than himself for care and direction, an expression of which is found, for example, in the words of the Greek poet, Homer:

> As young birds ope the mouth for food,
> So all men need the gods.

An example of modern supernaturalism is the acceptance of the revelation and miracles of the Bible. It is opposed by *rationalism,* which formulates its beliefs entirely by the exercise of reason.

SUPERSTITION, *su per stish'un.* Superstition represents a phase in the history of thinking. The most difficult art that man has had to learn is the art of reasoning. He has learned it very slowly, very imperfectly. Primitive habits of thought, childlike inclinations to believe, yet persist; such tendencies are responsible for the continuance of superstition. The contrast to and the remedy for superstitious thinking is scientific thinking. In these days of general education, every one knows a considerable mass of facts and of the relations of cause and effect, which science has established by observation, proof and insight into principles or laws of nature. Every one's mind has been drilled and formed by some measure of scientific thinking. But outside this limited range—and even within it—all sorts of notions are held which are more closely related to superstition than to science.

Among the relatively uneducated masses, the tendency to cling to the earlier, simpler habits of belief is strong; it was far stronger when education was confined to the elect, and even they were imperfectly freed from unscientific notions and practices. Because science has illuminated so fully the facts of physics and chemistry, of

biology, physiology and the rest, and initiated men into the scientific point of view, the outgrown beliefs and systems of past ages seem strange, and the practices curious and absurd. But in milder form, in less serious directions, we may sympathize with the feelings that led to such beliefs and practices. Superstitions reflect an attitude of mind, a way of thinking about the happenings and relations of the world; that mental habit—pernicious at worst, uncritical at the best—plays an important part in the regulations of human conduct.

The Strange and Unknown. A reason or explanation satisfies curiosity, but its more practical end is to guide conduct. The strange, the unknown, induces fear and uneasiness. Understanding makes for mental adjustment. As events are understood, man becomes at home in the world of happenings; he anticipates, prepares and in some measure controls his fate. But his questionings go beyond this immediate purpose; his curiosity is always asking: Why? The history of early science and of superstition shows what kinds of answers were satisfactory in the childhood of the race.

Foretelling the Future. The most general interest of inquiry is to read the signs of events and foretell the future. Such foresight or insight was regarded in primitive communities as a gift, a privilege of the elect; the predecessor of the man of learning was the priest, medicine-man, soothsayer, and wonder-worker. He professed to know the ways of nature and the mystic forces that control destiny, including especially the spirit forces which all primitive religions recognize. In more established societies, he may be, like Joseph, an interpreter of dreams; for dreams come from the unseen world and bear upon the personal fate of the dreamer. The Romans had professional augurs; by the flight of birds, or by the appearance of the entrails of sacrificed animals, by omens of sky and everyday incidents, they decided when the signs were favorable for battle, for alliances, expeditions, or the personal fortune of king or leader. The Delphic oracle, the Cumaean sibyl, illustrate the religious aspect to this function; for science and religion develop together, as in primitive societies the priest, the wise man, the diviner or sorcerer are one. Through him as a medium, the gods are implored to prevent storms or plagues, to bring good crops and successful enterprises. There may be an alliance with evil spirits as well as good ones; the sorcerer's power may be feared as well as respected. He has to do with the reading of omens, the telling of fortunes, the preparation of charms, the cure of disease, and the protection against enemies. The world in which he exercises his art is dominated more by fears than by hopes, for unseen dangers and evil spirits are constantly threatening. The reading of signs and control of fate by charms and countercharms most amply illustrate the setting in which superstitions flourish. The tendency to believe and be influenced by such practices is the superstitious bent. In surveying the varieties of superstition, we may observe the *motives* that prompt belief—always some strong desire or fear; the *means*, that is, the practice followed, usually in relation to a set of principles or a system of interpretation; and the *basis* in observation of reasoning that supports it. Thus viewed, superstitions, though fanciful, cease to be arbitrary, and often acquire an interesting history; they become specimens in the museum of thinking.

Ascribing Motives to Nature. Underlying the notion that gave rise to the practices of divination and magic is the belief that events occur for their personal significance. The outer world and its happenings are interpreted in human terms. Nature is supposed to act with motives similar to human motives. A storm is thus regarded as the revenge of an offended god; a plague is a dire punishment for transgression of some sort; success will be the reward of generous sacrifices, and good luck of observance of minute prescriptions. Still more generally is the setting of nature interpreted as bearing upon personal ventures and fortune. In this type of reaction to their environment, men found the sky the most impressive object of contemplation; it becomes the symbol of the great beyond and the dwelling place of the mighty powers that control. It invites worship and awe. The sun, moon and stars with their regular, yet mysterious, changes; clouds, rain, wind, lightning, thunder; night and day, seasons, weather—these condition human enterprises. Out of this close relation arose the oldest of the sciences (astronomy) and the most widespread of superstitions. It should be proper to speak of all such notions as *astrological*, though astrology refers usually to the system in its elaborate form, as practiced from ancient times to within a few centuries. The notion that the stars are connected with human destiny is the underlying one. The heavenly light of a star in legend is associated with the birth of Confucius, as well as of Moses and of Jesus, with the birth of the Caesars of Rome or the

mighty of the earth; Napoleon seems to have had a sincere belief in his star of destiny. No less astrological is the belief that when momentous human events are to occur, portents are seen in the sky as on earth; when Rome was threatened the earth trembled, volcanoes broke forth, lightning bolts flashed, the heavens were obscured. In some minds a comet still strikes dismay as a sign that the end of the earth is approaching.

The Horoscope. Astrology shows the close relation of science and superstition. Important facts relating to the sun and moon, the stars and planets, were gathered under the motive of studying the celestial influences upon human life. Only three hundred years ago, Kepler, the most scientific astronomer of his day, practiced astrology. Though he spoke of astrology as the foolish daughter of a wise mother (astronomy), he had a measure of faith in the horoscopes which he cast and by which he earned his living. Astrology is a system of divination (which see), requiring astronomical data; the horoscope which predicts the fortune of the individual by reference to the position of the heavens at the time of birth is the most elaborate product of superstition that the human mind has devised.

It is not easy for our minds to follow or state its basis. We can understand the exercise of the imagination by which the planets, stars and constellations received names; these names were those of the gods of mythology, who in turn were accredited with certain powers and attributes. Again, some of the constellations were named in fancied resemblance of their outlines to the shapes of animals, and these animals, too, have qualities. Also, the movements of the heavenly bodies bring about changes of position—rising and setting, opposition and conjunction. Out of this elaborate set of relations a zodiac is formed and prediction begins. Mars is the name of a planet and of the god of war; Venus is the name of another and of the goddess of love. Jupiter has one disposition, and Saturn another. Consequently (?) a child born under the ascendancy of Mars will be violent and pugnacious; one under the dominance of Venus will be given to ardent love affairs; those at whose hour of birth Jupiter presided will be jovial (for *jovial,* derived from Jove-Jupiter—is an astrological word); and those with like relation to Saturn will be saturnine, or morose and gloomy in disposition. "A child born under the sign of the *lion* will be courageous, but one under the *crab* will not go forward in life; one born under the *waterman* (aquarius) will be drowned" and so on; and this merely because the arrangement of certain stars suggested the shape of a lion, and the lion is a bold, courageous beast; another the shape of a crab, which has the habit of walking backward; a third that of a water carrier, and in water one may drown. No other attempt—at least none with so ancient and influential a history—to bring together in the way of cause and effect the most remote happenings and relations, is quite so far-fetched and extravagant. But that kind of reasoning underlies many systematized superstitions and loose beliefs. Such argument is called an analogy, in this instance a most feeble, remote and fanciful one. Pretentious systems like astrology may be called pseudo-sciences, because they attempt to build up a body of doctrine after the manner of a science, upon a basis that is entirely, or largely, akin to superstition.

Everyday Superstitions—Survivals of Astrology. Survivals of astrological notions appear in such practices as planting potatoes or cutting hair when the moon is waxing; the analogy being that as the moon grows, so will the potatoes or the hair. Conversely, alders and undergrowth and anything that one wishes to be rid of, should be cut when the moon is on the wane, so that as the moon disappears, so will they. The pathetic incident of Barkis going out with the tide reflects a like notion of sympathy between human life and the movements of nature. This manner of connection or sympathy or analogy—or however we describe the slight, fanciful, remote bond—extends to many details. Religious processions must follow the direction of the sun (from east to west), and never the reverse. In stirring batter for bread, or in churning butter, the motion must be sunwise. Reversing the direction will spoil the result or invite bad luck. Such reversal is itself an apt instance of analogy as it prevails in superstitious thinking. A reversal of a normal direction becomes unholy or unlucky. Since right-handedness is the normal relation, something of the weird or prohibited attaches to the left. *Sinister* means literally left, but has the secondary meaning of suspicious or of bad omen. A reference to the left shoulder reverses the meaning, or averts the consequences of a falsehood; or by the value attaching to the unusual, the left hind foot of a rabbit becomes a charm, or one must see the new moon over the *left* shoulder, and with sil-

ver in one's pocket to insure good luck. Superstition tends to become ever more detailed and determined. Every minute practice and circumstance carries some slight measure of good or ill luck. The choice of food, of dress, the conduct of the chase, of war, of sowing and reaping are all regulated minutely; for superstition invests trivial circumstances with significance and weaves a close web of regulation—of what to do and what not to do—that hampers action and fetters the mind. Science liberates while superstition enslaves.

The notion of sympathy or, in another form, correspondence, is prominent in magic; it is recognized as sympathetic magic. The common form of the practice is for working ill, casting a spell or bewitching. Some primitive people hardly attain to the notion of a natural death; death is either the obvious consequence of a violent injury, or to be accounted for as an obscure, magical influence. The sorcerer *wishing* the death of a victim makes a crude image of the person, or obtains a lock of his hair, the parings of his finger nails, an article of clothing, or dedicates some object to represent the victim; he then sticks thorns into the image, burns it, buries it, tortures it, pronounces incantations upon it, and all these evils will happen to the enemy. In a trial for witchcraft in 1618 two women were executed at Lincoln for burying the glove of Henry Lord Rosse so that "as that glove did rot and waste, so did the liver of said lord rot and waste." Such is sympathetic magic.

Protection by Charms. The two notions that disaster may be transferred by wishing evil, and that some persons have peculiar magical powers, unite in the belief in the "evil eye," which is widespread in the Orient and from there invaded Italy. By some peculiarity of appearance or manner, certain persons of low or high degree get the reputation of possessing the evil eye. Hence all sorts of countercharms are devised to offset the deadly glance. (It is interesting to note that we still call any trinket such as is carried on a watch chain a *charm,* but accept it merely as an ornament; yet these sometimes carry a device suggestive of the old meaning.) The charm may be in the form of a prayer written on paper, or a formula, or a metal or stone; the bits of mirror worked into Oriental embroideries carry the tradition of being such countercharms.

Any holy object or relic may be used as a charm, as by like power it may cure disease. Some are protections against definite ills such as shipwreck (this is true of some of the tattoo marks of sailors), or smallpox, or violent death. Others indicate a protection against the entry of evil spirits. The horseshoe nailed over the door is a familiar example. It survives as a general symbol of good luck, but carries mainly the notion of protection to a house. About it are gathered minute ceremonies. In the Spreewald (Germany) the finder of a horseshoe must at once return to his house without speaking to anyone (for speaking breaks the charm; similarly, when children *wish* on the first star that appears at evening, they wait to be spoken to before speaking); he must hang it over the door with the prongs up (for if hung the other way, the luck will fall out); it must be nailed with three nails and three blows of the hammer (mystic power of *three,* probably derived from the Trinity). (If a maiden finds a horseshoe and it has nails in it, the number of the nails indicate the number of years before she will be married; another example of the doctrine of signs.)

The origin of the horseshoe tradition is not clear. It belongs to modern rather than to the most ancient folklore. The virtue may lie in the shape, in the metal, in the association with the horse. The fact that we cannot readily determine the basis of its choice shows how far we have grown away from the type of thinking that gave it peculiar power. It is also a good example of the type of logic that is sufficient to establish a belief. There is no proof of relation between a horseshoe and good fortune. Favorable cases are noted and unfavorable ones neglected or explained away as due to lack of proper ceremonies or the bad character of the concerned.

A word should be said concerning the use of names as charms, and the importance of formula in incantations. The primitive idea regards the name and the person as closely connected; true names may be concealed lest by their use one may be bewitched. Holy names must not be spoken. The custom of "taboo" thus arises. But as in the tales of *Arabian Nights* the magic word brings the genii or opens the mystic door, so in the administering of drugs, or the performing of rites to bring luck mystic words are used; without the right words, the charm fails. Words are also countercharms, and if spoken at the proper moments ward off evil. The notion is preserved in the common superstition of touching wood to prevent the happening of trouble that is mentioned. (The wood is by some referred to

mbol of the cross.) A traveler mentions e was never in a railway accident, or a r mentions that her children never had ing cough; and at once touches or knocks od to prevent the mere mention of the tune from bringing it on. The Germans the same circumstance say "Unberufen," ly to prevent the mere name or mention bringing on the reality. The magic of has a large history in which remote no- of such connection are embodied. (See .)

Folklore of Salt. It is difficult to say ne article rather than another becomes nter of folklore superstition. The folk- f salt is a typical instance. It, too, is ed to keep off spirits; and throwing a of salt over the left shoulder is a cere- that in some countries is a means of g the devil at a distance. The spilling as a bad omen is widely current; it is nly interpreted as the sign of a quarrel, y because the acceptance of salt indi- friendly hospitality. An example of sym- ic magic with salt is the following from uth of England. A maiden on three suc- Friday nights throws a pinch of salt ie fire and says:

It is not this salt I wish to burn,
It is my lover's heart to turn;
That he may neither rest nor happy be,
Until he comes and speaks to me."

third night she expects to see her lover. the number *three*, and the day Friday, nly an unlucky day, but here chosen as ous for magic. Superstitions cumulate, d new notions mingle, but all in the rein. A Swiss peasant may be advised ify himself against evil spirits by carry- piece of fresh bread in one coat pocket psalm book in the other; a piece of rock each vest pocket or inside a briarwood pon which three crosses have been cut. ress may carry a rosary and a rabbit's the same pocket for a double protec-

ing Evil Spirits Out of the Body. The e of medicine offers a favorable field for the course of superstition. The early idespread notion that disease is caused invasion of a foreign spirit comes from ys when priest and physician were one. akes the form of exorcism. By weird nies the *shaman* or priestly medicine- tempts to drive or suck or frighten the ut of the afflicted body. The drum and the rattle, as well as a bag of herbs or magic odds and ends, are his insignia; the drum and the rattle are now the playthings of children. This notion is part of the more general one of the direct play of spirits (animism) in the forces of nature and the conditions of life. A dream is regarded as a real experience in which the soul of the sleeper takes an excursion to another world and brings back reports. Hence the practice of never awakening a sleeper, lest his soul fail to find its way back to the body. A like belief leads to the "ghost" or returning spirit—which plays a large part in superstition, and prepares the ground for such modern movements as Spiritualism (which see)—to ancestor worship, or to the return of ancestors in the newborn child.

It may be interesting to trace some of the remote superstitious forms of such belief. Sneezing has always been regarded as an omen, in some cases as of supernatural origin. There is the feeble notion that a spirit is leaving the body in the sneeze; to turn it to good omen the Italians say "felicita" and the Germans "gesundheit," thus wishing happiness and health. The spirit notion in seeking some visible expression has become attached to the image, or reflection which equally is involved in the personality. Hence the practice of covering mirrors at times of death or other occasions, of attaching a peculiarly bad omen to the breaking of a mirror; or again the objection of North American Indians as of other people to have their portraits or their photographs taken. This may be partly because the picture might be used for bewitchment, but is also because the sitter is parting with a portion of himself. The custom of naming children for ancestors is at once an intelligible sentiment and has a dim reference to an actual return; among some primitive people the name is given according to the returned ancestor thus recognized. Oriental people will not name a child for a living relative. In such remote practices or prejudices we may recognize the vestiges of ways of thinking that once determined the serious views of life.

Exorcism was practiced until within recent times. It was taken up by the Christian Church and there used both to cure disease, to rid haunted houses of their ghostly visitors, even against the damages caused by raids of animals, vermin, or plagues. In connection with the belief in the divine right of kings, the king's touch had peculiar power to cure scrofula. Particularly when the patient acted strangely, lost

consciousness, foamed at the mouth, or raved in delirium, was the explanation of possession by a spirit resorted to. The term *epilepsy* means seizure and refers to the possession by a spirit. (See WITCHCRAFT.) The astrological notions invaded medicine and led to the belief in the moon as a cause of insanity, in deference to which notion we still use the word lunacy (from *luna,* the moon), and the belief prevails that sleeping in the moonlight is peculiarly dangerous. It is another phase of this belief that associated certain days with the medical practices. An ancient manuscript mentions twenty-eight days "which were revealed by the Angel Gabriel to good Joseph, which ever have been remarked to be very fortunate days either to let blood, cure wounds, use merchandises, sow seed, build houses, or take journeys." (These good and bad days are really of Egyptian origin.) So medicines had to be taken at prescribed times and ceremonies. In such practice there is much room for the operation of a mental attitude. The patient was impressed by the weird and minute prescriptions, and his confidence of benefit expected (see FAITH CURE) was doubtless more effective in many cases than the potion or operation. It was this confusion of scientific fact and superstitious belief that Voltaire satirized when he said that incantations, together with a sufficient amount of arsenic, would doubtless kill your neighbor's sheep.

To illustrate the mixture of science and superstition the following may be cited from a letter of an M. D. of date 1581: "On Friday and Saturday, the sign will be in the heart; Monday and Tuesday in the stomach; during which time it will be no good to take your ordinary physic." (The different parts of the body were associated with the signs of the zodiac, as may still be seen in the picture of the human body and the astrological signs in an old-fashioned almanac.) In an almanac of 1571 one may read: "No part of a man's body ought to be touched with the Chirurgicall instruments or cauterie actuall or potencial, when the Sunne or Moone or the Lord of the Ascendant is in the same signs that ruleth that part of the man's body."

Medical Superstitions. The principle of analogy is variously illustrated in medicine. On the side of cure it appears in the doctrine of signature, by which eyebright (the flower having the appearance of an eye) is prescribed for eye trouble; walnuts (the shell like the skull, the kernel like the brain) for diseases of the brain; or in the practice of Chinese physicians to administer the tops, middles, and roots of plants for diseases of the head, chest, and legs respectively. The doctrine of sympathy was systematized in that country in the remarkable idea of treating not the wound but the weapon that inflicted it; as the salve was applied to the weapon, the wound would heal. The phrase "to take a hair of the dog that bit you" reflects the similar notion that by means of the hair one may cure the bite. Direct transfer is practiced by literally wishing or by contact placing the diseases upon an animal or an object, and thus relieving the patient. Recent cases are reported in which children attacked by whooping cough were required to cough in the face of a live catfish kept in a tub for that purpose. Similarly by analogy the fact that a loadstone will draw to it particles of iron has led to the belief that it will also draw rheumatism out of the body. When the magnet was relatively unknown, it was accredited with mystic powers; and European peasants carried one to avert and cure disease. Yet the faith is no different from that which leads credulous people to-day to pay handsomely for "electric" belts and similar fraudulent devices. (For the part that the magnet has played in allied practices, see HYPNOTISM.)

An interesting medical superstition, likewise with an ancient history, is the notion that unusual and uncanny objects will have powerful medical effects. The most nauseous concoctions were brewed as medicines. This practice is well preserved in the formula of the witches' caldron in *Macbeth:* "eye of newt, toe of frog, lizard's leg, scale of dragon, gullet of a shark, a tiger's entrails, slips of yew gathered in the eclipse of the moon," "root of hemlock, digged in the dark," "liver of blaspheming Jew," "nose of a Turk, and Tartar's lips," "finger of birth-strangled babe:"

> "Cool it with a baboon's blood
> Then the charm is firm and good."

Medical potions and charms (love potions or love philtres particularly) were not clearly distinguished; and the drugs used often combined with incantations or superstitious directions were impressive because of the mystic setting in which they were prescribed.

Present-day Superstitious Thought and Practice. The wide range of superstitious thought and practice may be further illustrated by a survey of current practices, sometimes followed with full belief in their virtue, more commonly in a playful half-belief not unmixed

with a feeling that it is on the whole safer to conform. From 875 persons (eighty per cent women, twenty per cent men), of ages sixteen to twenty-eight (students in two normal schools of California), there were obtained about 1,100 admissions of full belief in some superstition, about twice as many admissions of half-belief, and nearly four times as many disbeliefs. There were nearly as many who believed as who disbelieved in some form of luck or sign.

Spilling salt is the sign of a quarrel; bubbles in the tea cup or an itching skin means visitors; a blister on the tongue means that you have told a lie; when four persons in shaking hands cross hands, it means a wedding; when your ears burn, someone is speaking of you; when you have the cold shivers, some one is walking on the spot that will be your grave; stepping on the cracks of paving-stones means that you will fail in your lessons; giving a knife cuts friendship; breaking a mirror, walking under a ladder, postponing a wedding, opening an umbrella indoors, turning back on a journey, stubbing the toe, wearing clothes inside out, wearing a peacock feather, meeting a funeral, going out of a house through a window, sitting on a table, are all signs of bad luck; finding four-leaved clovers or horseshoes, picking up pins, returning part of money in payment are signs of good luck. Add to these the avoidance of Friday for enterprises, the refusal to sit down thirteen at table, the belief in dreams, and one has a fair notion of the great body of traditional folklore which has come down the ages and obtains more or less of a hold upon the growing minds of even the educated classes; incidentally the attempt to see some kind of meaning or connection between sign and event requires an initiation into the byways of outgrown systems and the ways of primitive thinking.

As now current, these are fairly innocent superstitions, which but slightly interfere with the regulation of conduct by scientific thinking. That even slight belief affects conduct is shown by the fact that rooms in hotels, cabins in steamships, houses on streets skip number thirteen or substitute twelve and one-half; that until recently steamers did not set sail on Friday; that some business men avoid transactions when the thirteenth of the month falls on a Friday; or even that a Thirteen Club exists in New York, formed of thirteen members, meeting for dinner on the thirteenth of the month at 7:13 o'clock, in order to defy this superstition.

Pseudo-Science—Mixture of Fact and Superstition. The effect of the belief or entertainment is quite different when transferred to the systems of interpretation of the pseudo-scientific type. These, too, show the mixed origin and reflect the history of superstition. Most flagrant is the practice of fortune telling. It rests primarily upon the doctrine (or the pretense) of special powers, obtained by peculiarities of birth (the seventh son of a seventh son, born with a caul), or of association with a favored tribe (the gypsies), or occult learning (India), or of actual success in prediction, or possession of a system. Fortune telling by cards (see DIVINATION) shows how readily chance combinations may be fitted to the ordinary run of human fate. But palmistry is the most typical in that it reads personal fortune from personal features, not as physiognomy attempted to do by observing what kinds of qualities are associated with features, but superstitiously by attaching far-fetched consequences to minute variations in the creases of the palm. Physiognomy, like phrenology, is a pseudo-science because its data are utterly inadequate, unreliable, and misinterpret the relations which they observe.

These attempt to build up knowledge after the manner of a science, but really depend upon prepossession, loose reasoning, and a hopeless kind of evidence. They are superstitious only in that the underlying idea continues the search for *signs* of qualities of personal value in outer indications. Psychology as a science has shown how differently one must proceed to obtain such insight, and that any rough-and-ready diagnosis or reading of character, much less of fate or fortune, is essentially unscientific, as is the search for the elixir of life, the philosopher's stone, or the fountain of youth. The case of palmistry is much worse; it is plainly superstitious in spirit, in method and in the kind of interpretation which it employs. The creases of the hand are adapted to use and presumably had their origin in the apelike ancestors of the human race who dwelt in trees. To call one of the major creases "the line of life" and predict longevity or an early death from its variable length is an utterly arbitrary procedure. The actual belief in such significance is quite on a par with the practice of savage tribes that put to death babes which their fortune tellers decided were born at an evil hour. And yet so strong are these superstitious tendencies that fortune tellers and palmists practice a suspicious if not entirely fraudu-

lent trade in all the large American cities, and business men, as well as men and women of all classes, consult them on financial ventures, love affairs, and the critical enterprises of life. Nothing could more pointedly illustrate the danger that lurks in a yielding to the superstitious habit, or permitting it to extend beyond the playful realm, where, as is true of myth and fairy tales and legends, it adds an innocent spice to adventures of human interest. Education insists that the mind's habits shall be formed by a scientific training, without stunting the imagination or neglecting the poetic and religious interpretation of life; for in all this there is illumination and progress. But superstition is stagnant and unprogressive; it is about the same in savage conditions, in the days of medieval darkness, and among the ignorant of all stages of civilization. Superstition survives somewhat naturally in those whose careers, like those of sailors, are constantly at the mercy of uncertain ventures; it may be for a like reason that gamblers, speculators, and others following venturesome forms of pursuits have a strong belief in luck and signs. Yet the more widespread tendency responsible for credulity is the inability to grasp the all-comprehensiveness of scientific thinking, and to cling to the suspicion that outside this established realm of cause and effect there is another type of influence, of an occult or hidden order, which now and again with a personal motive directs human fate. However inconsistently, the two tendencies manage to persist in the same mind, which in most affairs reacts scientifically, but keeps certain reserved areas for the exercise of the older type of beliefs. Such lapses or partial developments maintain superstitions and the attempted revival from time to time of pseudo-scientific systems, that are entirely out of keeping with the spirit and the life of the twentieth century and the educational ideal of a democracy. J.J.

Relating to Various Beliefs. The following articles in these volumes, while not all bearing on superstition, are of interest in this connection:

Alchemy	Occult
Astrology	Palmistry
Clairvoyance	Phrenology
Conjuring	Physiognomy
Demonology	Psychical Research
Divination	Psycho-Analysis
Faith Cure	Spiritualism
Hypnotism	Subconscious
Magic	Suggestion
Medium	Telepathy
Mesmerism	Theosophy
Mind Reading	Trance
Necromancy	Witchcraft

SUPPLY AND DEMAND. In economics, supply and demand refer to the quantity of a commodity on the market compared with the demand for that commodity for immediate use. The relation of these conditions determines in a large measure the price of the commodity. If the supply is greater than the demand the price is low, and if the supply is not sufficient to meet the demand the price is high. For a detailed discussion of this principle see ECONOMICS, subhead *Supply and Demand.*

SUPREMACY, *su prem'a si,* ROYAL, an English legal term used to denote the power of the king over the Established Church. Until the period of the Reformation in England, the Pope had been the acknowledged head in ecclesiastical matters. In 1534, after the Pope had refused to annul the marriage of Henry VIII and Catharine of Aragon and to declare the marriage with Anne Boleyn valid, Henry induced Parliament to declare him head of the English Church. Twenty years later Mary had this act repealed, but in the reign of Elizabeth Parliament passed a new Act of Supremacy. To-day the theory of royal supremacy is recognized, but the king presumes to exercise no control over spiritual matters. See CHURCH OF ENGLAND.

SUPREME COURT OF THE UNITED STATES. This is the highest judicial tribunal in the American republic and the most dignified body of its kind; its members are vested with greater power than is delegated to any other court in the world. Its existence was authorized in the Constitution of the United States (Art. III, Sec. I):

> The judicial power of the United States shall be vested in one Supreme Court, and in such inferior courts as Congress may from time to time ordain and establish.

The Constitution did not declare the method of organization of the court nor specify the number of justices of which it should be composed. To Congress was delegated the duty of organization, and in 1789 a law was passed which provided—

> * * * that the Supreme Court of the United States shall consist of a Chief Justice, of five Associate Justices, any four of whom shall be a quorum, and shall hold annually at the seat of government two sessions, one commencing the first Monday of February and the other the first Monday of August.

It is an error to give the members of the Supreme Court the title of *judges.* The act of Congress referred to them as *Justices,* a title of greater dignity and one which declares by inference their more exalted station. As the

demands upon this court have increased, there have been additions to the number of justices; there are at present one Chief Justice and eight Associate Justices. Members of the Supreme Court are appointed by the President of the United States, subject to confirmation by the Senate.

It has been found at times difficult to secure the appointment of men of requisite legal ability and standing who would consent to serve for the low remuneration provided by law. When the court was organized the Chief Justice received $4,000 per year and the Associate Justices $3,500. Later the Chief Justice received $10,500 and Associate Justices $10,000 per year. In 1907 the compensation was again increased to $13,000 and $12,500, respectively, and in 1911 to $15,000 and $14,500. To remove members of this high court from every political influence and to render the position more attractive, the Constitution provides that they shall hold their places during life or good behavior and that any member upon reaching the age of seventy years may retire from service, if he has been ten years a justice, and receive thereafter as long as he lives the regular salary of an Associate Justice.

Powers of the Supreme Court. The Constitution, in Art. III, Sec. 2, defined the classes of cases over which the Supreme Court is given jurisdiction. These are briefly summarized and explained below:

All cases affecting ambassadors, public ministers and consuls. These are officials of the general government whose relations are entirely with foreign governments. Therefore the national government instead of a court of the state in which the litigant may reside should have original jurisdiction.

All cases of admiralty and maritime jurisdiction. The high seas belong to all nations and an offense committed thereon naturally should be tried by a court representative of the nation involved.

All controversies to which the United States shall be a party. In cases of this nature the entire citizenship of a country is interested and a national tribunal rather than a state court must decide the issues involved.

All controversies between two or more states. To permit a court in one of the contending states to settle such a controversy would be prejudicial to fair judgment. An outside tribunal is necessary to which all parties may appeal.

All controversies between a state and citizens of another state and to controversies between the citizens of the same state claiming lands under grants of different states, the same reasons apply as in the case last mentioned.

All controversies between a state or the citizens thereof and foreign states, citizens or subjects. If citizens of any state offend a foreign state or its citizens or subjects, the peace and honor of an entire nation is involved rather than the safety of a single state.

Power over Legislation. The Supreme Court possesses unique power. It is the only court in history that has ever possessed the right to deny the validity of a national law, when properly brought to its attention. A law is invalid

THE NINE JUDICIAL CIRCUITS
The territories of Alaska and Hawaii are included in the ninth circuit.

and of no effect if in any way it is contrary to the letter or spirit of the Federal Constitution. The Court is empowered to pass also upon the validity of any state law; such a law cannot remain effective if it is contrary in letter or spirit to the Constitution of the United States. Up to the present time twenty-one acts of Congress have been declared unconstitutional, the last being the income tax law of 1904.

Inferior Courts. The Constitution provided that the judicial system should consist of not only a Supreme Court, but of such inferior courts as Congress may establish. With the growth of the country, district courts and United States circuit courts were established. In 1912 circuit courts were abolished and the number of United States District Courts was increased. These are located throughout the country in nine Judicial circuits. One Justice is assigned to the oversight of each circuit.

Chief Justices. Since the organization of the Supreme Court there have been nine Chief Justices. The longest tenure of office was that of John Marshall, who served more than thirty-four years. Following is a complete list:

John Jay, of New York. Appointed in 1789 by President Washington, resigning in 1794 to accept a diplomatic mission to England. See JAY, JOHN.

John Rutledge, of South Carolina. Appointed in 1795 by President Washington. He presided over one term of the court but the Senate refused to confirm his appointment in December of that year on the ground of lack of qualification.

Oliver Ellsworth, of Connecticut. Appointed in 1796 by President Washington. He resigned in 1799 to accept appointment as minister to France.

John Marshall, of Virginia. Appointed in 1801 by President Adams, and served until 1835. William Cushing of Massachusetts was appointed but declined the honor. See MARSHALL, JOHN.

Roger B. Taney, of Maryland. Appointed in 1836 by President Jackson. He served until his death in 1864. See TANEY, ROGER B.

Salmon P. Chase, of Ohio. Appointed in 1864 by President Lincoln. He served until his death in 1875. See CHASE, SALMON P.

Morrison R. Waite, of Ohio. Appointed in 1874 by President Grant. He served until his death in 1888.

Melville W. Fuller, of Illinois. Appointed in 1888 by President Cleveland. He died in 1910. See FULLER, MELVILLE W.

Edward D. White, of Louisiana, then an Associate Justice, was appointed in December, 1910, by President Taft. He is eligible to retirement. See WHITE, EDWARD D. E.D.F.

Consult Carson's *History of the Supreme Court of the United States, with Biographies of All Justices;* Moore's *The Supreme Court and Unconstitutional Legislation.*

SURABAYA, or **SOERABAYA,** *soo'rah bah'yah,* the largest city of the island of Java, and the capital of a residence (province) of the same name. It is situated on the northern coast on the Surabaya Strait, and lies opposite the small island of Madura. Surabaya is the naval and military headquarters of the Dutch East Indies, and is the most important commercial center of Java. A fine government house and a mint are among the principal buildings, and a naval arsenal, also a cannon foundry and shipbuilding yards are points of interest. The exports include rice, cotton, coffee and sugar. Population, about 150,100, including more than 8,000 Europeans. See JAVA.

SURAKARTA, or **SOERAKARTA,** *soo'rah kahr'tah,* or **SO'LO,** the capital of the residency of Surakarta, Java, situated on the navigable Pepé River, in the center of the island. The town is connected by rail with Jokjakarta, Surabaya and Samarang. A garrison and a fort are features of interest, and the emperor of Surakarta, a sovereign in name only, resides here, maintained in magnificence by the Dutch. The chief exports are rice, cotton, coffee and sugar. Population, about 118,000, including over 1,500 Europeans.

SURAT, *soo rat',* the capital of the district of Surat, in the province of Bombay, British India, situated near the western coast, on the Tapti River, about 150 miles north of the city of Bombay (see map of Asia opposite page 417). For two centuries Surat was a city of great commercial importance, and was classed among the most populous cities of Asia, but it has declined since the English East India Company removed to Bombay. It rose to prominence during the War of Secession in America, when it became the shipping point for great quantities of India cotton. The four Mohammedan mosques, Parsee and Hindu temples, a clock tower eighty feet high and a medieval castle prominent on the river front are among the chief points of interest. Textiles and small ornamental objects are manufactured, and cotton and grain are exported. A British military camp is stationed at Surat. Population in 1911, 114,868.

SURGERY, *sur'jer i,* a department of medical science that has made extraordinary progress since the beginning of the nineteenth century. Surgery attempts to cure disease and to overcome the effects of injury by various operations in which the surgeon's knife has a prominent part. While this form of medical practice was known to the ancient Egyptians and to the Greeks and Romans, it did not become a powerful force in saving human life until the nineteenth century, when the use of anesthetics became general, and Lister, Pasteur and other scientists made known their marvelous discoveries in the field of bacteriology. At the present time the field in surgical practice is almost without limit.

Some of the most remarkable cures have been effected in the case of abdominal diseases. It is not considered an unusual operation, for instance, to remove the affected part of a diseased intestine, even several feet of it, and to sew the severed ends together. Sometimes two openings are made in the intestine, one above the diseased part and one below. Then the two openings, placed opposite each other, are united, and the contents of the organ follow the new route. An enlarged spleen, a diseased gall bladder or a diseased kidney may be removed and the patient make a complete recovery. Diseased kidneys are also opened and drained and freed of abscesses, and a floating kidney is sewed fast to the proper place of attachment. These are but a few of the successful operations that are performed by modern surgeons in treating diseases in the abdominal cavity. Great advance has also been made in the treatment of brain diseases. Tumors and abscesses in this organ can be successfully removed, cut arteries be secured, gunshot wounds cured, and pressure on the brain corrected. Certain forms of epilepsy caused by disease of the brain have been cured by operation. Other triumphs of surgery are the correction of squint (crossed eyes), grafting of

healthy skin on raw wounds or burns, transfusion of blood, straightening of crooked legs, and transplantations of healthy organs, pieces of bone and tissues to take the place of diseased parts. The knife is still the most important means of cure for cancer, and surgery is successfully applied in numerous cases of goiter —disorders that tax the skill of the physician.

In the days before the development of antiseptic surgery many lives were lost because of the unavoidable after effects—fever, abscesses, blood poisoning, gangrene, etc. Such complications as these were the result of ignorance. Surgeons were not particular about the state of cleanliness of their hands, clothing, instruments or bandages, to say nothing of the patient, and, furthermore, they did not understand the necessity for precautions in this respect. Contrast the old methods with those of the modern operating room. The skin in which the incision is to be made is scrubbed with soap and water, then with ether and then with a powerful antiseptic solution like corrosive sublimate and water. Until the operation takes place this surgically-clean area is kept covered with an antiseptic dressing. The instruments are thoroughly disinfected, and during the operation, whenever they are laid down they are placed either in a tray containing an antiseptic solution or upon disinfected towels and sheets. If a sponge or instrument happens to fall on the floor it is laid aside until it is again disinfected. Surgeons and nurses scrub their hands and nails in soap and water, alcohol and an antiseptic solution, and their linen aprons are likewise surgically clean. All bandages and dressings receive the same careful attention, so that the dangers of pus formation and similar after effects are reduced to a minimum. In other words, wounds are kept free from germs.

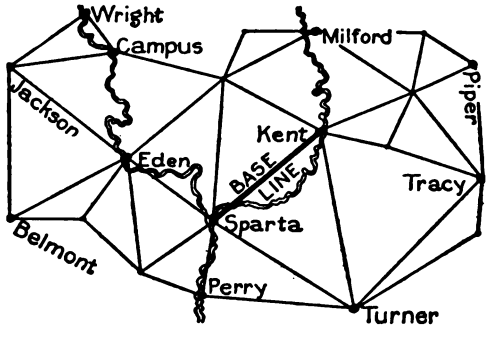
The efficacy of modern surgical methods was tested on a large scale in the War of the Nations, when the wounded were cared for by the thousands. In the base and field hospitals maintained by the belligerents all that science could bring to bear on the subject was put to the test, and marvelous were the results achieved. One of the discoveries that attracted much attention was a new method of irrigating wounds, the idea of Dr. Alexis Carrel (which see). Though many men left the hospitals permanently maimed, large numbers were saved from terrible disfigurement by means of modern surgery, and untold numbers of lives were saved through operations conducted on scientific principles. S.C.B.

Consult Fowler's *The Operating Room and the Patient;* Ashhurst's *Surgery.*

Related Subjects. The subject of surgery is closely connected with the following topics in these volumes. Since a number of these have extensive indexes the range of reading indicated is a wide one.

Amputation	Fracture
Anatomy (with list)	Granulation
Anesthetic	Lithotomy
Antiseptic	Medicine and Drugs (with list)
Bacteria and Bacteriology	Tourniquet
Bandage	Trephining
Disease (with list)	

SURVEYING, *sur va'ing,* the art of ascertaining the shape and area of any portion of the earth's surface, or of running lines and determining angles to fix boundaries. *Land surveying,* with which most people are familiar,



HOW AN AREA IS SURVEYED

Starting with a base line, as between Sparta and Kent, in the drawing, other lines are laid, completing a triangle. With one of the new lines as a base line another triangle is laid out. This process is continued until all the objectives have been gained.

is for the purpose of fixing boundaries and determining areas of comparatively small plots of ground. In the United States and Canada the boundaries and divisions of public lands have been fixed by government surveyors. The land surveyor uses two instruments for running his lines—a surveyor's compass or a transit, and a chain for measuring distances. The above diagram deals with land surveying.

Surveying for fixing boundaries is often called *plain surveying. Topographical surveying* is conducted on a much larger scale and includes the measuring of altitudes and mapping the elevations and depressions of the region. Topographical surveying is used in making surveys for maps, and is usually under the direction of the national government. Surveying requires a thorough knowledge of mathematics and ability to use delicate instruments with a high degree of accuracy.

Related Subjects. The reader is referred to the following articles in these volumes:

Coast and Geodetic Survey	Engineering
Compass	Lands, Public

SURVEY OF PUBLIC LANDS. See LANDS, PUBLIC, subhead *Ranges, Townships and Sections.*

SUSA, *soo'sa,* an ancient city of Persia, once the capital of the province of Susiana, or ancient Elam. It occupied a site on a plain in what is now the province of Khuzistan. During the reign of Cyrus it was captured from the Babylonians, and when Darius II became king in 521 B. C. he made it the ruling city over the whole Persian Empire. Several of the Persian kings built beautiful palaces, the remains of which form some of the most magnificent ruins of Asia. From the time of Alexander Susa gradually declined, until now the so-called tomb of Daniel, which is really a Mohammedan mausoleum, is the main landmark of the once famous city.

SUSQUEHANNA, *sus kwe han'a,* **RIVER,** a river which flows through one of the most important industrial regions in Eastern United States. It is formed by the union of two small branches whose sources are respectively Schuyler and Otsego lakes, in Central New York. The main stream flows in a general southwesterly direction to the Pennsylvania line, traverses that state in an irregular course southward, and then flows for a short distance through Maryland, entering Chesapeake Bay at Havre de Grace. Its total length is about 500 miles, and its chief tributaries are the Chemung, the West Branch and the Juniata. Considerable timber is floated on this stream, but otherwise it is useless as a commercial route because of its swift current and shallowness. On its banks lie the cities of Harrisburg and Wilkes-Barre, Pa., Port Deposit, Md., and Binghamton, N. Y.

SUSSEX, *sus'eks,* a town in Kings County, New Brunswick, in the south-central part of the province. It is on the Intercolonial Railway, forty-six miles southwest of Moncton and forty-four miles northeast of Saint John. Sussex is one of the more important of the smaller towns in New Brunswick. It has an agricultural college, a provincial dairy school, and provincial militia drill grounds and armory. The town owns its water and sewerage system, but a private company owns the lighting plant. The manufactures of the city include such varied products as refrigerators, butter and cheese, paper boxes, packed pork, furniture, leather and mineral water. The neighborhood has many rich farms, and also supplies salt, lime, plaster and lumber. Population in 1911, 1,906; in 1916, estimated, 2,350.

SUT'LEJ, a river of India, the most southerly of the five rivers of the Punjab and the largest tributary of the Indus (which see). Rising in the lofty plateau of Tibet, nearly three miles above the sea, the Sutlej winds its way through the passes of the Himalayas, traverses the hill states of Simla, and then flows in a southwesterly direction through the Punjab, joining the Indus near Mithankot. Its length is about 950 miles. The Beas and the Chenab are its most important tributaries, and below its junction with the latter it is called the Panjnad, or Five Rivers. The Sutlej is of little importance as a navigable waterway except for inland craft, but its waters are used in irrigating the arid plains of the Punjab.

SUTTEE, *suh te',* a variation of the Sanskrit word *sati,* meaning "good wife," is the name given to the practice formerly common among all the Hindus, of burning the widow on the funeral pyre of her deceased husband. If the husband died away from home, she occupied the pyre alone. The custom is not enjoined in the Vedas, but it seems to be of great antiquity, for when Alexander the Great visited India, about 327 B. C., he encountered instances of it. It seems originally to have been practiced only by the wives of princes, but came to be widespread, particularly among those professing Brahmanism.

In theory, the widow always was willing to sacrifice herself; in practice, compulsion was often used, but one of the emperors in the seventeenth century forbade thereafter all but voluntary immolations. The exact methods by which it took place were various. Sometimes the widow leaped upon the burning pile from a window; sometimes she lay down upon the unlighted heap, clasping in her arms the dead body of her husband; and sometimes she herself was required to set fire to the pile. Lest her courage might fail, and she might try to escape, attendants often held her body down with poles.

The British always disapproved of the suttee in India, but did not feel strong enough until 1829 actually to prevent it. Naturally it did not cease all at once, and it is quite probable that in rare cases the practice is still secretly maintained, although those now found guilty of aiding or abetting it are sentenced to a penal colony.

SWALLOW, *swahl'o,* a small, graceful bird, with long, powerful wings, small, weak feet fitted only for perching, and a large mouth

The swallow is come!
The swallow is come!
O, fair are the seasons, and light
Are the days that she brings,
With her dusky wings,
And her bosom snowy white!
—LONGFELLOW: *Hyperion.*

adapted to the capture of insects, upon which it feeds almost exclusively. It devours countless numbers of mosquitoes.

Swallows are found in all parts of the world. Most of them are migratory, flying great distances to avoid cold or to find a food supply. So far as is known they migrate by day, flying together in large numbers and spending the nights in woods or marshes. They nest both in pairs and in colonies. Some make their homes in holes in banks or trees, and others build rough, stuccoed nests of clay or mud, which they place on beams of bridges or on rafters in barns. Several species have modified their nesting habits through their contact with man. Their eggs are usually four or five in number, the color being pure white or white spotted with brown.

Among the swallows of North America are the *barn swallow,* with steel-blue back, chestnut-colored breast and deeply-forked tail, perhaps the swiftest in flight of all birds; the *cliff swallow,* distinguished from the barn swallow by its square tail; the *tree swallow,* which often nests in bird houses; and the *purple martin,* described in these volumes under MARTIN.

Consult Nuttall's *Manual of the Ornithology of the United States and Canada;* Davie's *Nests and Eggs of North American Birds.*

SWAN, *swahn,* a stately water bird, belonging to the same family as the geese and ducks. The beauty of its snowy plumage and the proud poise of its long, graceful neck have ever suggested to the song writer and the poet a majestic white ship sailing over the waters. It is a poetic fancy of unknown origin that the swan chants its own death dirge, whence the "swan song" famed in legend and in verse. This tradition has no scientific basis, but it has been the inspiration of many charming poetic lines, such as are found in the *Evening Songs* of the German poet Heine, printed herewith.

There are eight species of the swan group, found in various parts of the world. They have the common habit of migrating in V-shaped flocks, and of uttering loud, trumpetlike notes when on the wing. They subsist on the seeds and roots of water plants and worms and mollusks, dipping the long, curving neck far into the water as they probe the bottom in search of food.

The well-known *American,* or *whistling,* swan nests in the vicinity of the Arctic Ocean and the Hudson Bay region, migrating in winter as far south as the Gulf of Mexico. Between October and April large flocks of the whistling swans wend their way southward, flying, it is said, at the rate of 100 miles an hour, and filling the air with sounds that range from deep bass notes to the shrillest tones of a clarinet. The nest, lined with down from the bird's own body, is made of sticks and water plants, and is sometimes two feet high and six feet across. Two to six eggs, grayish in color, are

And over the pond are sailing
Two swans all white as snow;
Sweet voices mysteriously wailing
Pierce through me as onward they go.
They sail along, and a ringing
Sweet melody rises on high;
And when the swans begin singing
They presently must die.
—HEINE: *Evening Songs.*

laid in June. The young are at first covered with grayish-brown down, which becomes snowy-white by the end of a year.

This species is a little less than five feet long, and is entirely white except for a yellow spot between nostrils and eyes. The legs, feet and bill are black. Similar to the whistling swan

is the *trumpeter,* an American bird now rarely seen. It is larger than its whistling cousin and has a call resembling the tones of a French clarion. Except for the presence of the yellow spot on the head of the whistler, these swans are alike in plumage.

In the eastern hemisphere are found the *European whistling* swan, *Bewick's* swan, a smaller bird, and the *mute* swan, the majestic species commonly seen in zoölogical gardens, parks and estates. It is said that it never uses its voice in captivity. A beautiful species known as the *black* swan, which has a scarlet bill banded with white, is native to Australia. In South America is found the *black-necked* swan. M.A.H.

Consult Beebe's *The Swans,* in report of the New York Zoölogical Society (1906).

SWEATING SICKNESS, a very dangerous epidemic which swept over Europe at intervals during the fifteenth, sixteenth and early eighteenth centuries. Englishmen seemed especially susceptible to it, and were attacked both at home and on the Continent. The disease, which had as its victims chiefly strong, healthy men, was characterized by a short chill, headache, coma and profuse perspiration. It ran its course in about a day, and was fatal to a large number of victims. The sweating sickness is always to be found in some part of the world, but it is to-day generally called military fever.

SWEATSHOP SYSTEM, the name applied to an industrial policy by which the manufacture of goods is carried on outside of the owner's premises under conditions so unfavorable that they have aroused vigorous public protest. The name *sweatshop* suggests a place of grinding toil; the system, known also as the *sweating system,* has for its victims poor people who under its operation unhampered by law have no means of escape from despair.

The manufacturers of clothing instituted the policy by contracting for the making of much of their product outside their own shops. Rents were saved, responsibility was shifted, management expenses were decreased and factory laws evaded. They probably did not foresee the evils which would result from the contract system. Under the system a man or firm receiving a contract will sublet it to a small shop in a tenement district where the people are in the grip of poverty and where labor is therefore cheap. The owners of such shops take contracts at as high prices as they can force from the middleman and pay their employees by what is known as piecework, giving them little more than enough to keep them alive. Working for so little, the employees often spend from twelve to eighteen hours a day at their tasks to make their weekly wage as large as possible.

Another side of the system affects the home even more directly. Often a contractor will give work to a man who takes it into his home. His house becomes little better than a workshop, and he presses his family, even including little children, into the daily labor, and here, too, the hours of work may extend into the night.

The sweating system is thus charged with overcrowding in shops, developing insanitary conditions, forcing children into labor without safeguards, and causing an increase in disease and deformity due to confinement. The helpless workers are unable to improve their condition within their own ranks, because they are scattered and their employment is irregular. Complaints may deprive them of even the slight income they are able to earn.

The above description pictures the system in its worst aspect in great cities, but the statement is not overdrawn. So scandalous have been disclosures that thousands of people have pledged themselves not to purchase clothing made under the contract system. Public attention was first called to the matter when it was found that diseases from the tenements were carried in the new clothing manufactured under the sweating system. Legislatures have taken official notice of the evil, and in some states have remedied conditions by laws which demand light, airy, roomy buildings, reasonable hours of labor, regular inspection of machinery and premises, and restrictions upon employment of children. In the states of Massachusetts, New York, Ohio and Illinois the laws provide that all rooms where such work is performed shall be licensed and regularly inspected. There has also been a growing tendency within recent years among manufacturers to abate the evil. Many of the largest clothing producers have equipped buildings with plenty of room and every modern device to provide security and health, and they pay wages which assure improved living conditions. E.D.F.

Consult Adams and Sumner's *Labor Problems: A Textbook.*

Related Subjects. The reader is referred to the following articles in these volumes:

Eight-Hour Day
Factory and Factory System
Labor Legislation
Labor Organizations

SWE'DEN, a kingdom of Northern Europe, occupying the eastern and larger portion of the Scandinavian Peninsula. Because of the great number of lakes, rivers and watery lanes in Sweden, the country has been called a "vast fresh-water archipelago," and there is an old saying that when God divided the water from the land, Sweden was overlooked.

Size and Location. Having an area of 172,963 square miles, Sweden is a little less than three times the size of the state of Michigan, and is about one-half as large as British Columbia. It is almost 200 miles longer than the state of California, but is not so wide. About one-twelfth of the total area is under water. The seacoast extends 1,400 miles when measured in a straight line, but although the bays and indentations are not so numerous or deep as those of Norway, the coast is penetrated by many inlets, and over 4,700 miles are washed by the sea. The Gulf of Bothnia and the Baltic Sea separate Sweden and Russia, and the Cattegat and Skagerrack lie between the southern end of Sweden and that of Norway.

The People. The Swedes are an enlightened and educated people, and with the other Scandinavians are in the front ranks of the world's progressive peoples. They are more vivacious and light-hearted than their western kinsmen, the Norwegians, but they have the same reputation for frankness, honesty and industry. If one expects to see the picturesque national costume of Sweden in its modern cities, he will be disappointed, for except on festival days and in a few rural communities, it is no longer worn.

Large numbers of Swedes have emigrated to the northwestern states of the American Union. Nevertheless, the population has doubled in the last century. In 1910 the inhabitants numbered 5,522,403, and in 1914 the population was estimated at 5,679,607. With the exception of 25,300 Finns, 7,100 Lapps and 1,000 foreigners, the entire population is Scandinavian. A large proportion of the inhabitants live in the rural districts. The largest cities are Stockholm, the capital, Gothenburg, Malmö and Norrköping.

Religion and Language. The Swedish people are very religious, and are much interested in all phases of Christian social work. All but one per cent of the population are members of the Swedish Lutheran Church, which is the State Church. The clergy are supported by the parishes and the proceeds from the sale of Church lands. With the exception of the Mormons, who were expelled in 1912, all denominations are tolerated. Among the dissenters, the Methodists and Baptists are most numerous.

The Swedish language is a North-Germanic tongue, and it closely resembles the Danish. It has, however, a more delicate and musical accent than the Danish, and not only the correct pronunciation, but the very meaning of the word depends upon the accent or variation in the tone of the voice.

Literature. Sweden has produced some of the world's greatest thinkers and literary men, among whom are Bellman, the national poet, Swedenborg, a religious philosopher, and Linnaeus, the naturalist. Swedish literature had its beginning in the written laws of the thirteenth century, and the earliest verse consisted of the popular ballad and folk song of the fifteenth century. The Renaissance and Reformation, which so greatly influenced the literature of continental Europe and England, were scarcely felt in Sweden and Norway. Swedish literature reached its height during the reign of Gustavus III, himself a writer and great patron of learning. This was the age of Bellman, Swedenborg and Linnaeus. At the close of the nineteenth century, which produced the poets Tegnér, Stagnelius and Runeberg, the modern spirit of realism swept over Sweden. The greatest writers of the modern period include Strindberg, the radical dramatist, and

Selma Lagerlöf, a novelist who won the Nobel Prize for literature in 1909.

Education. Illiteracy is almost unknown in Sweden. Education is free and compulsory, and an excellent system of elementary and high schools is maintained, under governmental supervision. There are fifteen normal schools and many technical and navigation schools. The universities are at Lund and Upsala; the latter, founded in 1477, is one of the oldest universities in Europe.

The Land. The mountainous sections of Sweden are confined to the northern part of the country, called *Norrland,* and to the range of rocky precipices and mountains along the Norwegian frontier. The most rugged scenery and highest peaks are in the north, where the lofty, snow-crowned Sarjektjokko and Kebnekaisse rise 7,000 feet. Among the deep ravines and steep precipices of these mountainous regions there are green meadows and beautiful lakes, and their long, eastern slopes are scarred by many torrents which in the lowland sections widen into broad channels and innumerable lakes. Southeast of the lowlands of Central Sweden are the rolling, forest-clad hills of the Smaland Uplands, and in the extreme south lie the fertile plains of Scania, the best agricultural region in the country.

LOCATION MAP

The present boundaries of Sweden reduce it to the rank of one of the small countries of Europe in area, but its commercial importance is not to be measured by its size.

The wooded and rocky coast of Sweden is picturesque, but it has not the rugged grandeur of the fiords of Norway. The entire eastern coast is penetrated by bays and sounds, and is bordered by many islands, which are most numerous near the city of Stockholm. Gotland and Oland, two of the largest islands in the Baltic Sea, belong to Sweden. The coast and islands of the Gulf of Bothnia are rugged, but not lofty. On the Baltic, gleaming white *klints,* or cliffs, alternate with low beaches, but gloomy fields of bare cliffs border the shores of the Cattegat and Skagerrack, and dangerous rocks lurk just below the surface of their waters.

Rivers and Lakes. Most of Sweden's many rivers rise in the highlands along the Norwegian border and flow southeast to the Gulf of Bothnia and the Baltic Sea. Among the largest of these rivers are the Tornea, flowing 290 miles through large lakes and forming the boundary with Russia; the swift Lulea, the Pitea, the Skelleftea, the Indals, the Dal and the Angermann, which is navigable seventy miles by seagoing vessels. The Klar, rising in Norway, flows south to Lake Wener, and the Göta, the most important commercial river, flows from Lake Wetter to the Cattegat. Six beautiful falls in the latter river, at Tröllhattan, furnish 700,000 horse power, making this city the chief industrial center of Sweden. Navigation is extended beyond the falls by means of locks, and the river, connecting with canals and lakes, forms a water boulevard across the country (see *Transportation,* below).

The numerous picturesque lakes, bordered by wooded shores, not only furnish some of the greatest beauties of Swedish scenery but also are of vast importance in navigation, and they abound in fish. The lakes of the lowland region are larger than the mountain tarns. Lake Wener has an area of 2,114 square miles, and Lake Wetter of 715 square miles. Other large lakes are Hjelmar and Mälar; the latter washes the shores of 1,300 islands, and on its shores Stockholm, "the Venice of the North," is situated.

Climate. Although the moderating influence of the Baltic Sea and Gulf of Bothnia is felt on the eastern coasts, no part of Sweden has so equable a climate as that of Southern Norway, where the seasons are tempered by the Atlantic winds. There is a wide difference in the annual temperature of the northern part of the country, which lies within the Arctic Circle, and that of Scania, which is 900 miles farther south. Winters in the north last nine months, and in the south they are only two months shorter. The seasons of spring and autumn are very short, and in some regions are lacking altogether. At Stockholm the average temperature for July is 63° and for January 24°. The rainfall averages about twenty inches. It is heaviest during August, and the greatest amount falls in the south. In the northern part of the country the precipitation rarely exceeds thirteen inches.

Agriculture. Sweden has always been predominantly an agricultural country, but owing to the recent development of manufacturing and other industries the population is now about equally divided between farmers and those who follow other pursuits. The farms are generally small and are owned by independent

SWEDEN

Gustavus Adolphus

Peasant Children

Coat of Arms

Skate Sailing

Ski-ing

Swedish Peasant and Wife

Parliament Building

A Home in the Country

A Village Street

farmers. Scania and the Baltic islands are the most productive regions. Much of the marsh land in the lowlands is being reclaimed and cultivated. The principal crops are rye, oats, barley, wheat and sugar beets. Barley is the only cereal raised in the north, and the cultivation of sugar beets is largely confined to Scania and Gotland, the latter the most valuable of the Baltic islands.

Over three per cent of the land is in natural meadow, and cattle raising and the herding of swine are important. Sweden produces two-thirds of the cattle of the Scandinavian peninsula, and quantities of dairy products are exported to England and Denmark. There is a state department of agriculture, and there are many agricultural high schools and societies. Horticulture is also important; there are large botanical gardens at the universities, and nurseries are maintained by the government. Primitive methods of cultivation are now seen only in isolated districts.

Forests. More than one-half of Sweden is timberland. The uplands and mountains are clothed with dense growths of pine, spruce, birch and mountain ash; thick groves of oak border the lowland lakes, and beech forests separate the cultivated fields of Scania. One-third of the woodlands are public, the larger part of which belongs to the Crown and is controlled by a large forest service. Excessive cutting of timber and other abuses characteristic of America are prevented by law. An extensive area in the north has been made a national park, where hunting and logging are prohibited. There is an institute of forestry at Stockholm, and other minor forestry schools are maintained by the government.

Fisheries. The calm waters of the sea inlets are excellent fishing grounds, and sea fishing has long been one of Sweden's principal industries. Herring is the most important product, and there are large salmon fisheries in the mouths of the northern rivers. Sweden's export of salt and canned fish is not as large as that of Norway, and in recent years the annual catch has decreased in value. There are not nearly as many fish in Swedish as in Norwegian waters.

Mining. Sweden's mines are one of its chief sources of wealth. The northern and midland regions are especially rich in iron, and with the introduction of modern machinery the development of the mines has been rapid. Swedish iron ore is noted for its purity, and it excels that of any other European country. The annual output of iron is almost 7,500,000 tons, of which 6,500,000 tons are exported. Copper is mined extensively in Falun, and deposits of silver, coal, lead, zinc and sulphur pyrites are found in various parts of the country. There are schools of mining at Stockholm, Falun and Filipstad.

Manufactures. The vast power furnished by the southwestern rivers and the cheap electrical power developed by its use are building up large manufacturing industries. Factories are scattered throughout the small towns and rural districts, and a great many of the employees live in the country. In the north, especially along the Gulf of Finland, there are numerous sawmills. Lumber and timber products, including furniture, wood pulp, paper and pasteboard, are the chief manufactures of Sweden. There are large iron smelting plants and foundries in the midland districts, and the porcelain and glass factories, flour and woolen mills and sugar refineries are also important. Tröllhattan, Norrköping, Stockholm and Gothenburg are the chief manufacturing cities.

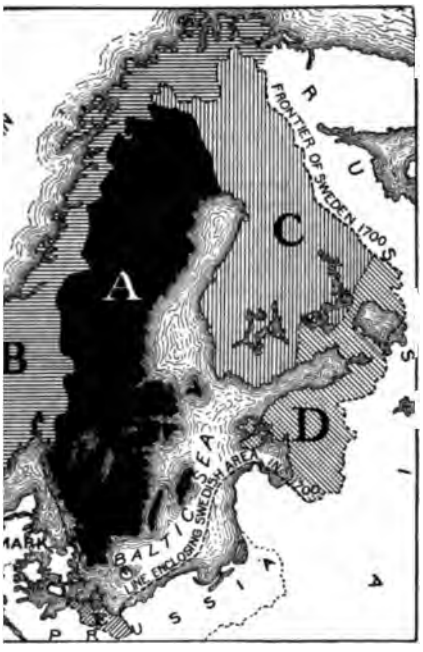
Transportation and Commerce. Besides many excellent roads and about 9,000 miles of railroad, Sweden has 2,500 miles of inland waterway afforded by the many rivers, canals and lakes. The Göta River, Lake Wener and smaller lakes and canals form a continuous highway from the Skagerrack to the Baltic, only fifty-six miles of which is through artificial canals and in which there are fifty-eight sets of locks. The canals of Southwestern Sweden are traveled in normal times by 128,000 ships annually. As the Baltic Sea was unsafe for traffic during the War of the Nations, new railroad lines between Swedish cities and Russian ports were opened in 1915, and a railroad now encircles the Gulf of Bothnia, affording transportation from Stockholm to Petrograd.

The commerce of Sweden is important for a country of its size, and its large merchant marine, consisting of over 2,800 ships at the outbreak of the War of the Nations, carries much foreign as well as domestic trade. Since 1911 there has been a uniform tariff on all Swedish imports, and a national trademark, adopted by the General Commercial Association of Sweden, is placed on all Swedish exports. The chief imports are coal, metal goods, machinery, raw textiles and foodstuffs, and the principal exports are timber products, paper, iron, live stock and dairy products. The chief ports are at Gothenburg and Stockholm, but Malmö and Helsingborg are also important.

Government and History

y and Navy. Military service is com- for all men from twenty to forty-two of age. The first nine years consist of in the regular army, the next four years reserve troops and the last seven years national militia, called the *Landsturm.* otal strength of the army in peace is 670,000 men.

rnment. Sweden is a constitutional chy. The constitution was adopted in nd has been several times amended and ed. The executive power is vested in the He is assisted by an administrative coun-



SHRINKING SWEDEN

map shows how Sweden, once the first y power in Europe, has lost territory from time, until now it is completely overshad- y its powerful neighbors to the east and whose military activity for many years en a source of anxiety to its people. Present area of Sweden; (*B*) Norway, 1905; (*C*) Finland, lost in 1809; (*D*) area 1721; (*E*) Western Pomerania, lost in

state. The right to make laws is vested Diet, which consists of two chambers. upper chamber there are 150 members, for six years by the municipal and pro- representatives, or *landsthing.* They e property owners, or must have an an- ncome of about $800. The second cham- nsists of 230 members, elected for three by universal manhood suffrage. The ad- ministration of justice is independent of the government. It is controlled by the Chancellor of Justice; he is appointed by the king and represents the Crown; the Attorney-General, who is appointed by the Diet, has general supervision over all courts.

Local Government. There is a high governor at Stockholm and a prefect in each of the twenty-four provinces. In all communes and municipalities women taxpayers as well as the men have the vote and are eligible to communal office. The communal assemblies and city councils decide all questions of local administration. Religious affairs and elementary education are controlled by parish assemblies. Liquor traffic is rigidly controlled by the government. Spirits may be sold only by responsible societies, and the profits go to the municipality.

Early Growth of the Kingdom. Much of Sweden's history before 1000 A. D. is legendary. Christianity was introduced in the middle of the ninth century, but was not fully established until the eleventh century, during the reign of Olaf, who defeated Norway and made Sweden the mightiest kingdom in the north. During the next 200 years Sweden's history is a story of the warfare between the Swedes in the northern part of the country and the Goths in the south, and between both of these peoples and the Danes. About the middle of the twelfth century the government and the Church were organized, and under the kings Sverker, Eric IV and Charles VII Sweden's political and economic development began.

In 1397, by the Union of Kalmar, Queen Margaret of Denmark and Norway united Sweden with the other two Scandinavian countries under its rule (see NORWAY, subtitle *Government and History*). The Swedes were restive under the predominance of Denmark, and in 1523 they broke away from the Union and elected Gustavus Vasa king of Sweden. During the reign of this great sovereign, the Reformation spread to Sweden, and Lutheranism was made the State religion. From this time development was rapid, though prosperity was temporarily disturbed by the religious struggles of the succeeding reign.

Sweden Becomes a Great Power in Europe. Under Gustavus Adolphus (1611-1632), Sweden became one of the greatest European military powers and commercial countries. This king's ambition for territorial expansion and his Prot-

OUTLINE AND QUESTIONS ON SWEDEN

Outline

I. Location

(1) Latitude, 55° 20′ 18″ to 69° 3′ 21″ north
(2) Longitude, 11° 6′ 19″ to 24° 9′ 11″ east
(3) Boundaries
(4) Relation to other countries

II. Size

(1) Length
(2) Breadth
(3) Actual area, 172,963 square miles
(4) Comparative area

III. Geographic Features

(1) Coastal peculiarities
(2) Mountains
  (a) Location
  (b) Greatest heights
(3) Rivers
  (a) Canal connections
(4) Lakes
  (a) Economic importance
(5) Climate
  (a) Moderating influences
  (b) Differences due to latitude

IV. The People

(1) Population
  (a) Increase in spite of emigration
(2) Racial peculiarities
(3) Language and literature
(4) Religion
(5) Education

V. Resources and Industries

(1) Agriculture
  (a) Regions where it is practiced
  (b) Chief crops
(2) Forests
(3) Fisheries
(4) Mines
(5) Manufacturing

VI. Transportation

(1) Railroads
(2) Rivers and canals
(3) Commerce

VII. Government and History

(1) Form of government—constitutional monarchy
  (a) Executive
  (b) Legislature
  (c) Judiciary
  (d) Local government
(2) Army and navy
(3) History
  (a) Early years
  (b) Union with Norway and Denmark
  (c) Sweden at the height of its power
    1. Gustavus Adolphus
    2. Charles XII
  (d) Napoleonic Era
  (e) Later nineteenth century
  (f) Separation from Norway
  (g) War of the Nations

Questions

What is meant by the expression "fresh-water archipelago" as applied to Sweden?

How does the outer coast line of Sweden compare with that of Norway in length? How do the two compare if all the indentations are counted?

What Swedish author won the Nobel Prize, and when? What are her most famous works?

How long is a summer day at Stockholm? How long is a summer day in the most northern part of the country?

What is the "skerry fence" of Sweden? What are the *klints*, and where are they to be found?

What is the "Venice of the North," and why is it so called?

Why is the climate more extreme than is that of Norway, which is in the same latitude?

How many miles of artificial waterway were found necessary in connecting the Skagerrack with the Baltic?

What king raised Sweden to a place of power among the nations of Europe?

faith drew him into the war in Germany. olicy of Gustavus Adolphus was con- after his death; new territory was ac-, and for some years Sweden was recog- as a great power, but in 1675 its forces ompletely defeated by Frederick William ndenburg, its sea power was lost, and ruin ily averted by the treaty of peace.

eyes of all Europe were again turned on n during the reign of Charles XII, who d Denmark, Poland, Russia and Norway. ring his death Sweden was weakened by al struggles, and even Gustavus III 1792), who wiped out the factions and ed the royal power, was unable to re- Sweden to its former prosperity.

tions with France. Charles XIII (1809- having no heir, chose Bernadotte, one poleon's marshals, as crown prince. Ber- e joined the allied powers in the final row of Napoleon, and as a reward for pport, Norway in 1814 was transferred den from Denmark, for the latter coun- d united with Napoleon. Bernadotte to the throne in 1818 as Charles XIV and during his reign and those of the ding kings Sweden prospered.

nt History. In 1905 King Oscar II re- to give Norway a separate consular serv- d Norway declared its independence but ved friendly relations with Sweden. Two later Gustaf V succeeded to the throne. n remained as neutral during the War Nations as its position made possible, gh its commerce and industry suffered, s neutral rights on the sea were violated. 5 Sweden prohibited the export of arms unitions to the belligerent nations and ted against Germany's submarine warfare ngland's use of neutral flags. In June, friendly relations were established be- Sweden and its old enemy, Russia, with to financial, commercial and industrial its. In September, 1917, its neutrality estioned by the entente allies upon dis- that its diplomatic agents were permit- ispatches to reach Germany through its n Office.

r Items of Interest. The chain of islands the coast of Sweden is commonly known "skerry fence."

shortness of the northern summers is in sure compensated for by the length of the nd the many hours of sunshine. At the northernmost point the sun may be seen uously from May 26 to July 18, and at Stockholm it is visible for eighteen and one-half hours each day during that period.

In the southern part of the country there are more than 1,000 species of flowering plants, while in the northern regions fewer than 200 species are found.

The wild reindeer is found, though it is rare, but large herds of the domesticated reindeer are kept by the Lapps.

One of the outstanding things the visitor to the northern forests notices is the impression of emptiness and lifelessness. Even in summer there are almost no animals to be seen, and very, very few birds.

In most countries the taking of the census is a government affair, but in Sweden the census is drawn up by the clergy—an official report every ten years and an estimate every year.

One of the most universally observed and most elaborately celebrated of the national holidays is Midsummer, which falls on June 23 and 24. E.B.P.

Consult Barnes's *Things Seen in Sweden;* Kennedy's *Thirty Seasons in Scandinavia.*

Related Subjects. The reader who wishes more detailed information will find it in the following articles in these volumes:

CITIES

Gothenburg — Stockholm
Malmö

COAST WATERS

Baltic Sea — Cattegat
Bothnia, Gulf of — Skagerrack

HISTORY

Charles IX, X, XI and XII — Norway, subtitle *Government and History*
Denmark, subhead *History* — Oscar I and II
Gustaf V — Thirty Years' War
Gustavus I, II, III and IV — War of the Nations

LEADING PRODUCTS

Herring — Lumber
Iron — Rye

SWEDENBORG, *swe'den bawrg,* EMANUEL (1688-1772), a Swedish scientist and inventor and the founder of a religious sect known as the Swedenborgians, or New Jerusalem Church. He was the son of a Lutheran bishop, and was educated at the University of Upsala, going afterward to England to pursue further the study of the sciences. Returning, he published a volume of poems, edited a mathematical journal and at the age of twenty-eight wrote the first algebra ever produced in Sweden. He studied especially the science of mining, and was called by Charles XII to a chair in the Royal College of Mines. In 1718, his family

having been raised to the nobility, he took his seat in the house of nobles. Subsequently he traveled widely in the interest of scientific knowledge and published valuable treatises on metallurgy and anatomy and a diary of his experiences.

Always of a deeply religious nature, in 1745 he turned himself almost exclusively to the study of a peculiar system of theology and spiritual philosophy which he claimed to have received through direct intercourse with the spirit world. He wrote many books supporting his mystical theories, and while those who accepted his system as a whole have been comparatively few, he has undoubtedly made a strong impression on modern religious thought. Kant admits having been largely influenced by him, and Goethe embodied much of his teaching in his masterpiece, *Faust*.

Swedenborg died in London, but by royal decree his body was removed to Sweden and interred with honors at the University of Upsala. The most important doctrines advocated by him are stated in the article SWEDENBORGIANS.

Consult Worcester's *Life and Mission of Emanuel Swedenborg.*

SWEDENBORGIANS, *swe den bawr' ji anz,* the religious sect that follows the teachings of Emanuel Swedenborg, organized by him in London, in 1787, as the New Church or the New Jerusalem Church. Their belief, as set forth in Swedenborg's writings, regards the universe as one whole, the outward world being the counterpart of the inner and spiritual. Beneath the literal meaning of the Bible is the spiritual meaning, which is open to those who have inner discernment. Justification is not attained by faith alone, but whoever fears God and works righteously shall be saved. God is one and the real Trinity is in Christ. The last judgment has already taken place, and the New Jerusalem has descended in the form of the New Church. There is no physical resurrection, but at death men's eyes are opened to the spiritual world of which they are already a part. They are drawn to heaven or hell by their own affinities. Angels are the spirits of departed human beings.

The first Swedenborgian Church in the United States was organized in Baltimore, in 1792. The American societies are grouped into state organizations called associations, and the General Convention of the New Jerusalem Church is composed of twelve of these associations and of nine separate societies. There is a smaller organization of the sect known as the General Church of the New Jerusalem. The larger body has about 8,500 communicants; the smaller about 800. See SWEDENBORG, EMANUEL.

SWEET ALYSSUM, *a lis' um,* a low, spreading plant of the mustard family, bearing clusters of tiny white flowers, and having four-sided stems which contain a bitter juice. It is a hardy little plant, blooming until late in the fall, and is often used as a border for gardens and flower beds. There are single and double varieties; some are dwarfed, and others grow eight or ten inches high. Sweet alyssum is easily raised, for it grows from seeds or cuttings, and thrives in any reasonably-fertile soil.

SWEETBREADS, *sweet' bredz,* certain glands in the calf which are esteemed as an appetizing food. There are two kinds, *neck sweetbread* and *stomach sweetbread,* the first being the thyroid gland, and the second, the pancreas. The latter is the more easily digested, and can be assimilated in less than half the time required for an equal amount of beefsteak. Great care should be taken in the preparation of the sweetbreads in order to make them palatable and appetizing. They should first soak in cold water for two and one-half hours; this water is poured off, and fresh, cold water placed in the pan, which is then brought to a boil on the stove. Boiling is allowed to continue for five minutes, after which the sweetbreads are again placed in cold water, to preserve their color. Now the fat and skin are carefully picked out, and when this process is completed the delicacy is ready to cook. Braise for one hour with meat stock and vegetables, then transfer to an oven and allow to brown. Sweetbreads may then be served with any sauce the taste may dictate. C.B.B.

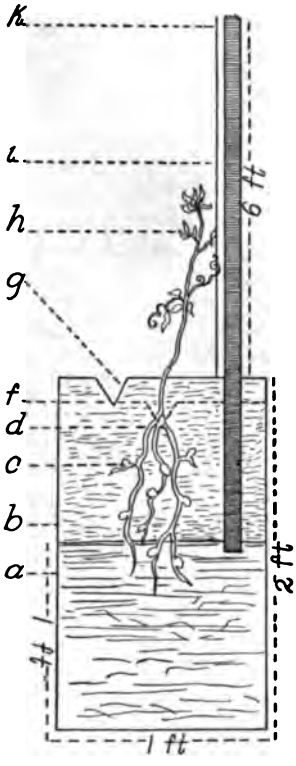
SWEETBRIER. See EGLANTINE.

SWEET FLAG, a tall, reedlike plant of the arum family, which grows along brooks and in marshy places in almost all parts of the northern hemisphere. Its stiff stems are tipped by spikes of green blossoms, and it has flat leaves shaped like a two-edged sword. They spring directly from the rootstock and grow to be two feet long. From this rootstock, which is fragrant and has some medicinal value as a tonic, perfume, hair powder and other toilet preparations are made. See ARUM.

SWEET PEA, *pe,* a favorite garden plant belonging to the same family as the edible pea. It is cultivated for the beauty and exquisite fragrance of its flowers, which are colored blue, red, purple, pink and white, and in shape suggest the butterfly. In the year 1699 seeds of a

white variety were sent to England from Sicily, and since that time numerous varieties have been developed by gardeners and florists in various parts of the world. In some varieties the flower petals are smooth and velvety; in others they are crinkled and wavy. There are two general types—the tall-growing and the dwarf. The former, which is the more popular, produces a rough, hairy stem that climbs by tendrils and needs support.

Successful cultivation of the sweet pea requires a rich, well-drained soil, plenty of sunshine and free circulation of air. The seed should be sown in April, in the proportion of one ounce to thirty feet of row; plants should be at least two inches apart in the row and the rows be separated by four feet of space. As soon as the plants appear above ground cultivation should begin. The soil should be stirred lightly at least three times a week, preferably after a rain, and the rows should be kept free of weeds. Application of liquid manure and free watering of the plants are necessary. Watering should be done as often as required, and liquid manure, which is plant food, be applied at least six times during the season. This plant food can be secured by putting a wheelbarrow load of cow manure in a barrel and filling the barrel with water. Keep the barrel covered to prevent the entrance of insect pests. Stir the liquid three or four times, and then allow it to stand for a week. Then remove the froth from the top and dilute the mixture until it is the color of very weak tea. The liquid should be poured into a trench dug three inches deep and four inches from the vines. The accompanying diagram shows how to prepare the stakes for the vines. M.K.



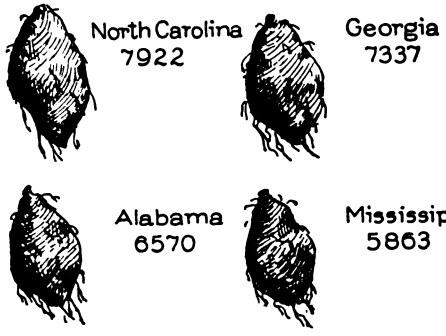
DIAGRAM

Showing how to plant and stake the sweet pea. (*a*), one foot of manure and soil; (*b*), one foot of fine garden loam; (*c*), nodules on roots of pea plant; (*d*), the seed planted (summer) one inch deep in a furrow two inches below the surface edge of the trench; (*f*), surface soil to be leveled in as the plant grows; (*g*), furrow in which to apply liquid manure; (*h*), pea vine clinging to wire support; (*i*), wire, 4-inch mesh or chicken wire; (*k*), iron support.

SWEET PEAS

Consult Kerr's *Sweet Peas up to Date;* Stevenson's *The Modern Culture of Sweet Peas.*

SWEET POTA'TO, a plant belonging to the same family as the morning-glory, with long, creeping stems and heart-shaped leaves. It is cultivated for its sweet, edible roots, which somewhat resemble the tuber of the common potato; from this fact the name is derived. The edible part of the potato, however, is an



PRINCIPAL CENTERS OF PRODUCTION

The figures represent the average crops for three successive years.

underground stem, not a root, and the two plants belong to different families (see POTATO). There are three general classes of sweet potato roots, with yellow, red and white flesh respectively, but the yellow varieties are the most

WHERE SWEET POTATOES GROW
Where the dots are most numerous the yield is greatest.

common. The flesh is rich in starch and sugar, and is wholesome and digestible. So-called yams are really sweet potatoes.

The plant is probably a native of America, but is now cultivated in warm countries all over the world. The most important sections in the United States, as may be seen from the accompanying diagram, are in the Southern states near the coast. Sweet potatoes thrive best in a warm, well-drained soil, and when the plants have gained a good start they require little rain. First the tubers are sprouted in a specially prepared bed, and the young "sets" are planted when about four inches tall. The roots are harvested before frost and will keep indefinitely if stored in a warm, dry place.

Consult Nordin's *The Sweet Potato: How to Grow and Keep It.*

SWEET WILLIAM, one of the oldest garden flowers, a member of the pink family, ranging in color from white to dark red and purple. The source of its name is not positively known, but possibly when the plant was transported from France to England the pronunciation of its French name was twisted into *Willy* and thence into *sweet William.* The fringed, velvety blossoms grow in clusters usually of one color, but occasionally a single stem contains flowers of varied hues and markings. The wild *sweet William* is a member of the phlox family (see PHLOX). See illustration, in next column.

SWETT, JOHN (1830-1915), a prominent American educator and writer, noted particularly as the author of *Methods of Teaching,* which for many years was the standard textbook on pedagogy in the West. He was born at Pittsfield, N. H., and was educated at Pittsfield Academy and at Merrimac Normal Institute. After teaching in district schools in his

SWEET WILLIAM

native state, he was appointed principal of a school in San Francisco, and in 1863 became state superintendent of schools in California. He received the appointment of deputy superintendent of schools of San Francisco in 1870, and six years later was promoted to the office of city superintendent. Thirteen years later he retired from active service. *The History of the Public School System of California, American Public Schools* and *School Elocution* are among his publications. As joint author with William Swinton, he compiled a number of texts on language, grammar and geography.

SWIFT, a small bird with strong, flexible wings, but weak feet, found in practically every part of the world. In color it is a mouse-brown or a greenish-black, some species having white throats or rumps. Swifts fly tirelessly all day, capturing their insect food while on the wing and seldom alighting. At dusk they return in large flocks, performing many graceful evolutions as they fly, to the cave, cliff or hollow tree where they live in colonies. Their notes, continuously repeated, are little more than chatterings. They build curious nests, in which sticks, leaves, etc., are cemented together with saliva, some being almost entirely composed of saliva, as the edible birds' nests of Eastern Asia. See EDIBLE BIRDS' NESTS.

The American swift has been forced almost entirely to the chimney as a home. In perching it clings to the wall with its feet, bracing itself with its spine-pointed tail. It is said to break off the twigs for its nest with its beak as

THE SWIFT AND ITS NEST

it flies. The nest is semicircular in form, firmly cemented to the side of the chimney. The eggs are white in color and four to six in number. Two broods are usually reared in a season.

SWIFT, JONATHAN (1667-1745), an English satirist and clergyman, born in Dublin. He was unusually advanced as a child—could spell at three and at five could read any chapter in the Bible. At the Kilkenny School, and later at Trinity College, Dublin, where he was poorly supported by the charity of an uncle, his course of study was most irregular. History and poetry appealed to him, and he read them greedily, but for the set course of study he had nothing but scorn. In consequence, it was only by special favor that he obtained his degree.

JONATHAN SWIFT

Early Discouragements. At twenty-one he became secretary to Sir William Temple, of Moor Park, Surrey, at a salary of twenty pounds ($100) a year. He was treated as a half servant, and forced to eat at the second table, but though his pride was extreme he retained his office for five years, finding some solace in the fact that he had much time to devote to study and writing. In 1694, in an attempt at independence, he accepted a small parish in the Irish Church, in a distant, secluded place, but his dissatisfaction was deeper than before, and in a short time he returned to the Temple household. Here he remained until the latter's death. In Temple's family he became acquainted with a beautiful girl, Esther Johnson, who was to play so important a part in his life and whom he made famous as the "Stella" of his writings.

His Literary Career. In 1699 Swift attended the Earl of Berkeley as secretary and chaplain on a journey to Ireland, and was made vicar of Laracor and Rathbeggan. During all his clerical career he engaged in political writing, and in 1704 won wide fame on the publication of his *Tale of a Tub,* a humorous and forceful satire on insincerity and pedantry in literature and in theology. Such a work could not, however, fail to injure his chances for preferment in the Church. In the decade that followed he became a conspicuous figure in politics. Beginning as a Whig, he became so opposed to the principles of his party that in 1710 he turned from it entirely, making plain the change by accepting the editorship of the Tory *Examiner.* Through his essays he exerted a strong influence on the trend of public thought, but in 1714 he shared the Tory loss of power and was forced to content himself with an appointment to the deanery of Saint Patrick's, Dublin.

During his residence in Ireland previous to 1710, Swift had urged Miss Johnson and her friend Mrs. Dingley to make their home near him, and thus he enjoyed a continuance of his early friendship. While he was in England, from 1710 to 1713, he wrote the letters that compose the *Journal to Stella,* a work of deep biographical interest. In the same period he became involved in a connection with Miss Hester Vanhomrigh which caused him great embarrassment and resulted tragically. Upon his departure from England the young lady, driven by her love for him, followed him and settled near him in Ireland, and by some secret communication learned of his friendship for Stella, to whom she finally wrote. Having thus incurred Swift's anger, Miss Vanhomrigh died of the grief caused by the rupture of their friendship (1723).

In the year following this unfortunate affair, Swift won the lasting esteem of the Irish people by issuing the *Drapier Letters,* in which he vigorously opposed the granting of a patent for copper coinage in Ireland. Two years later appeared his *Gulliver's Travels,* a highly amusing satire on human nature. He persisted in his efforts to lighten the wrongs of the Irish, until in 1742 the fate that he had long dreaded came upon him, and he became insane. He remained an imbecile until his death. A.MC C.

Consult Smith's *Dean Swift;* Collins' *Jonathan Swift: A Biographical and Critical Study.*

SWIFT CURRENT, a city in the southwest corner of Saskatchewan, and on the main line of the Canadian Pacific Railway, 110 miles west of Moose Jaw and 147 miles northeast of Medicine Hat. It is also on the Vanguard-Bassano branch, by which it is forty-four miles north of Vanguard and 236 miles southeast of Bassano. The Swift Current River, which flows through the city, is not navigable. In 1901 Swift Current was a village of 121 people; by 1911 it had grown to a town with a population of 1,852; and in 1914 it was incorporated as a city. Population in 1916, 3,181.

Like most of the towns in southern Saskatchewan Swift Current is prosperous because it is in a rich wheat-growing region. It is a large shipping town, and is also a wholesale and retail distributing point. It is the seat of a judicial district, and has a land-titles office, customhouse, Dominion lands office and municipally-owned hospital. The courthouse, a conspicuous structure, was completed in 1915 at a cost of $125,000. Other attractive buildings are the town hall, erected in 1913 at a cost of $45,000; the fire hall, also erected in 1913; and three public schools, one completed in each of the years 1914, 1915 and 1916. The total expenditure for the three schools was $325,000.

SWIMMING, *swim'ing.* Every boy and girl should learn to swim, for the following reasons:

1. In case of accident on the water ability to swim may enable one to save his own life, and possibly the lives of others.
2. Swimming affords one of the best means of developing the muscles and invigorating the system.
3. Swimming is a delightful recreation.

Notwithstanding the importance and value of this art it is probable that not over one-third of the people know how to swim. Various reasons have been given for this lack of knowledge of a useful and pleasure-giving recreation. Chief among them are that swimming is very difficult to learn; learning to swim is dangerous to life and health, and there may be lack of opportunity. All these reasons rest upon false notions. It is nearly as easy for a person to learn to swim as it is for a child to learn to walk; it is said that the babies of the South Sea islanders can swim before they have learned to walk.

Under reasonable conditions learning to swim is attended by no danger whatever. But, granted that the learner were in some danger, would it not be more reasonable for him to confront this danger under conditions which will enable him to overcome it than to run the risk of encountering it unexpectedly without means of self-preservation?

There is scarcely a community where it is not possible to provide swimming pools.

Preliminary Steps. The first step towards learning to swim is to overcome fear of the water. Select a place where the water is clear and free from currents and weeds, with the bottom sloping gradually. Wade out slowly until the water reaches the waist. Take a full breath, then bend the legs until the head is under the water. Open the eyes and look at the bottom for a second or two, then rise to a standing position. Repeat the exercise until the head can be placed under water with confidence.

Having learned that you can place your head under water for a few seconds, you are ready for the next preliminary step, which consists in learning to lie in the water and float. Wade out to where the water is waist deep, face the shore, incline the body slowly, stretching the arms out straight with the palms down. As the arms and head strike the water the feet will rise. Straighten the legs and you will be able to lie in this position several seconds without sinking, if you do not attempt to raise the head. Open the eyes and paddle gently with the hands. You will see that you are moving towards the shore.

The human body as a whole is lighter than water, but some parts of it, particularly the head, are heavier than water. Consequently, when the head is partially supported in the water it is much easier to float.

Probably several exercises may be necessary to enable you to lie in the water with confidence, but you should gain this confidence before attempting to swim.

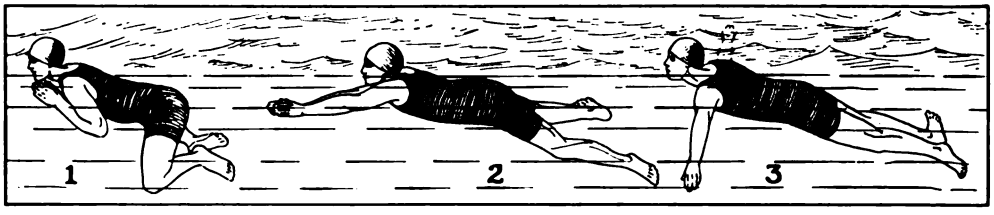
The Breast Stroke. The breast stroke is the simplest swimming stroke and the one that should be learned by beginners. While an instructor is of great advantage, one may learn

to swim by himself. In so doing the following suggestions will be found helpful:

1. Wade out until the water reaches the neck, and take particular notice of its buoyant force. You can scarcely keep your feet on the bottom. Continue this practice until you feel perfectly at home in water of this depth.

2. When you have gained confidence in water of the depth described above, wade out until the water reaches the chest. Face the shore. Place the hands palms together on the chest, bend forward, straightening the arms as in the act of floating, previously described. The hands should be three or four inches under the water, the palms should be downward and the fingers close together.

3. As you lean forward, and before straightening the arms, bend the knees so that the body will be in the position shown in the first illustration.



THREE POSITIONS DEMANDED BY THE BREAST STROKE

4. As the arms are straightened, straighten and spread the legs so that you will take the position shown in the second picture.

5. Swing the arms outward, describing a quarter circle with each. The palms should be turned outward so that they will act as paddles in propelling the body.

6. As you swing the arms outward bring the legs together until the heels touch. This movement also propels the body.

These motions complete the breast stroke. The movements should be made slowly, since quick, jerky movements fail to support one in the water and quickly exhaust the swimmer.

Other Stokes. One who has mastered the breast stroke will have little difficulty in learning what is known as the *back stroke*. Instead of keeping the arms in the water, as in the breast stroke, they are lifted into the air and carried in a sweep beyond and in front of the head, and the palms are kept upward. Then the palms are given a half turn and the arms sweep around. As they begin this latter movement the legs are drawn up, as in the breast stroke. The force of the kick which follows propels the body along as the arms are being extended for their next stroke.

The *side stroke* carries the body forward on its side. It is better to lie on the right side, for the heart action is more likely to be unimpaired and the leg action is freer. The right arm is thrown forward beyond the head, with palm downward and level with the under side of the head. It is then extended its whole length and without bending at the elbow is brought rigidly downward until the hand reaches the legs. It is then brought upward quite close to the body for the beginning of the next stroke. The left hand, scoop-shaped, is turned outward at a right angle with the forearm; and the arm, with elbow bent, is thrust forward and then makes a pulling stroke down to the left hip. The legs are opened wide, then swung together as the left arm is extended and the right arm finishes its downward stroke.

The *crawl*, or *Australian crawl*, was adapted from the South Sea islanders; it is a comparatively new stroke in America and Europe. In executing the crawl the swimmer lies flat upon the water. The legs from the knee to the feet are alternately raised above the water halfway to the knee and are brought down with all possible force, one leg at a time. The arms are bent at the elbows, the hands entering the water just in front of the head; they are then pushed sharply back and come out of the water near the hips. When the right arm is dipped the left leg is struck down, and vice versa.

The breast stroke and the three strokes explained above are the most popular with swimmers of all nations. The art of diving is explained on pages 1814-1815.

Breathing. Next in importance to a proper stroke is proper breathing. An expert teacher of swimming says:

> To nothing else so much as breathing is due the inability of those who can swim to keep up the speed and regularity of movement for an indefinite period.

In swimming, the breathing should be directly opposite from what it is out of the water. A quick, deep inspiration should be taken through the mouth, and the air should be exhaled slowly through the nostrils, and this should be done at each stroke.

Use of Artificial Aids. Expert instructors in swimming seem to be about equally divided on the advantages to be derived from the use of

artificial aids, which consist in inflated belts, inflated bags, or "wings," belts to which a rope and pulley are attached, planks, cork mattresses and the like. Without doubt one may learn to swim more quickly with one of these aids than without it. On the other hand, there is great danger of one's forming the habit of relying upon a device and not becoming an independent swimmer. If one must learn in deep water the device is a necessity, but to one who has the advantage of shallow water, artificial aids are of doubtful benefit.

One can gain much help by practicing the strokes on land, lying on a box or narrow bench. One may practice the leg movement in the water by pushing a raft or a boat in this way. W.F.R.

Consult Dalton's *How to Swim;* Spalding's *Athletic Library No. 37 R;* Corsan's *At Home in the Water.*

SWINBURNE, *swin'burn,* ALGERNON CHARLES (1837-1909), an English poet, born in London. His father was Admiral Charles Henry Swinburne; his mother was Lady Henrietta, a daughter of the third Earl of Ashburnham. He was educated at Eton and at Oxford, where, however, he did not complete his course. In 1861, the year that he left the university, he published *The Queen Mother* and *Rosamond,* both modeled on the Elizabethan drama; but though they were very remarkable for the work of so young a poet, they attracted little attention. In the same year he made a short continental tour, during which he visited Landor at Florence.

In 1865 his genius for the first time became recognized, when *Atalanta in Calydon,* a tragedy of exceptional metrical beauty, was published. Not long afterward appeared his *Poems and Ballads,* which brought upon him vigorous censure because of his revolt against conventional morality. The wonderful melody of the verses could not be denied, however, and it might almost be said that Swinburne, like Byron, became famous in a night. A number of political songs and odes followed, *A Song of Italy, Ode on the Proclamation of the French Republic, Songs before Sunrise* and *Songs of Two Nations.* In 1881 was completed a trilogy begun in 1865, of which Mary, Queen of Scots, is the subject, the three parts being *Chastelard, Bothwell* and *Mary Stuart.* Of his other poems may be named the tragedy *Erechtheus;* a second and a third collection of *Poems and Ballads;* the odes addressed to Victor Hugo; *Tristram of Lyonesse; A Century of Roundels;* the tragedies *Locrine* and *Rosamund, Queen of the Lombards; The Tale of Balen* and *Astrophel and Other Poems.*

As a Critic. Swinburne was not a painstaking judge, but arrived at conclusions by a sort of instinct that was often clear and truthful. Among his critical works are *Essays and Studies, Miscellanies, Studies in Prose and Poetry* and *Under the Microscope,* written in reply to an attack on the Pre-Raphaelites, with whom Swinburne was associated. Swinburne's poetic genius consists in his mastery of metrical form, in which he has never been surpassed in English poetry, and an almost unerring choice of the right word and phrase.

Consult Drinkwater's *Swinburne: An Estimate;* Mackail's *Swinburne.*

SWINE. See HOG.

SWIN'TON, WILLIAM (1833-1892), a Scottish-American educator, and author of widely-used textbooks, was born at Salton, in Scotland. When he was ten years old he emigrated with his parents to America, and was educated at Knox College, Toronto, and Amherst College. He taught at girls' schools in North Carolina and New York, and in 1858 became a member of the staff of the New York *Times.* During the War of Secession he was with the Army of the Potomac as correspondent of the *Times,* and at the close of the struggle traveled in the South, studying educational conditions there.

In 1869 he was appointed professor of belles-lettres in the University of California, but five years later resigned and devoted himself to the preparation of textbooks. His spelling and language books, histories and geographies were more widely used than almost any other books, and he was awarded various honors for them. In the preparation of his grammars and geographies he called to his aid as coeditor John Swett, that his methods of presenting his subject might be passed upon by a master of pedagogy. He wrote also *Rambles among Words, Campaigns of the Army of the Potomac* and *The Twelve Decisive Battles of the War* and edited *Masterpieces of English Literature.*

SWISS GUARDS, a famous body of Swiss soldiers organized to protect King Louis XIII of France in 1616 and annihilated by the infuriated populace during the attack on the Tuileries, August 10, 1792. Their courage and devotion to duty is commemorated in the famous Lion of Lucerne, carved in the face of a rock at Lucerne, Switzerland. This monument is simply and pathetically dedicated to the

"fidelity of the Swiss." In 1815 a corps of Swiss guards was reorganized by Louis XVIII, but they were defeated and dispersed in the Revolution of 1830.

The Pope of Rome maintains a bodyguard of Swiss known as the Papal Guard, composed of picked men possessing the well-known Swiss qualities of courage, intelligence and fidelity.

An illustration of the *Lion of Lucerne* appears on page 3530 in these volumes.

SWIT'ZERLAND, a small republic of Western Europe, one of the most advanced democracies in the world, and one of the oldest republics. This little country, sometimes called "the playground of Europe," is far from being a playground to its sturdy inhabitants, who have established, in a land of many natural disadvantages, a prosperous and contented nation. Though it encompasses some of the loftiest peaks of Europe, Switzerland has an area of but 15,976 square miles, which is less than one-fourth the area of the New England states, or about half that of Maine. It has no seacoasts, being entirely surrounded by other nations. Germany and the Lake of Constance are on the north, Austria-Hungary and Liechtenstein on the east, Italy and Lake Geneva on the south and France on the west.

General Features. The snow-clad Alps and the Jura range cover about three-fourths of the whole land, making Switzerland the most mountainous country on the continent. The Alps extend over the southern and central sections, and the Jura Mountains form a great curve in the northwestern part. Between these two mountain masses is an elevated plain where the majority of the people find habitation.

In the Swiss Juras there are no very lofty elevations, the highest summit, the Dôle, being a little over a mile above the sea, but their glacier-robed sister ranges send up many towering peaks, culminating in Monte Rosa (15,217). Mount Saint Gotthard is the center of the great Alpine ranges, whose splendid scenery has attracted visitors from all over the world.

Waters. Four of the important rivers of Europe make their way through Switzerland, draining into three different seas. The Rhine, made up of the Vorder-Rhine and Hinter-Rhine, flows into the North Sea. The Rhone rises in the great Rhone Glacier, receives various mountain streams, widens into Lake Geneva and flows finally into the Mediterranean. The Ticino, through the Po, drains into the Adriatic, an arm of the Mediterranean. The Inn drains into the Danube and into the Black Sea.

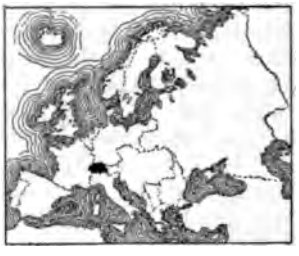
Besides its rivers, Switzerland has many lakes, and these are famous for the grandeur of their scenery. The two largest, Geneva and Constance, are at the southwest and northeast corners of the country, on the borders of France and Germany, respectively. On the shores of Lake Geneva stands the Castle of Chillon, made famous by the poet Byron in his *Prisoner of Chillon* (see illustration, page 1339). Around Lake Lucerne, in the west-central part of Switzerland, lived the men who laid the foundations of Swiss freedom. The Lake of Thun, southwest of Lucerne, is another very beautiful Swiss lake. On the south, between Italy and Switzerland, are Lake Maggiore and Lake Lugano. Lake Neuchâtel, the largest wholly in the country, is in the extreme west. The Rhine basin contains nineteen large, and thirty-seven small, lakes, and there are numerous Alpine tarns.

The melting of the snow in the mountains causes many mountain torrents which, milky-white in color, rush down to the valleys. Switzerland is noted, too, for its waterfalls. The highest of these is Staubbach, in the Lauterbrunnen valley, a lovely veil-like cascade which falls over a thousand feet. The Handeck, near the source of the Aar, falls 225 feet, and the Pissevache, in the Rhone valley, 200 feet. The Reichenbach descends in seven falls and the Grissbach in thirteen. The falls of the Rhine at Schaffhausen are only eighty-two feet in height, but an enormous mass of water descends.

People. In the racial characteristics of its people, Switzerland reveals two sharply contrasting strains—the Celtic and the Teutonic. In this country there are only thirty Celts to

every seventy Teutons, and the Celts are further weakened by being separated into three divisions—the Gallic, Italian and Romansh. Of these three divisions the Gallic speak French, the Italian speak Italian, and the Romansh their own language, a sort of rustic Latin, which is slowly dying out. The use of French, Italian and German, on the other hand, grows with the increase of the population. Indeed, German is spoken in every canton, although it predominates in the northern cantons and in Zurich, Bern and Lucerne. French is the prevailing tongue in Neuchâtel, Geneva, Valais, Vaud and Fribourg.

A glance at the map will show that the races have followed their natural divisions in the settling of the country, and that in the north Teutonic names predominate, while the Celtic cantons touch the French and Italian borders of the country. There are two exceptions to the general rule regarding racial predominances in population. One exception is in the Rhone valley, the other near the Rhine. These exceptions are caused by the nature of the mountain barriers which divide Switzerland from its neighbors. Five passes give Germany access to the Upper Rhone, while the French have but one. On the other hand, Germany has no easy access through the mountains to the Rhine, while on the southern bank there are many easy paths into the Italian valleys. As a consequence the upper waters of the Rhone are possessed by the Teutonic race and the Upper Rhine by the Celtic. But, generally speaking, the Teutonic cantons are found in the northern, and the Italian and French in the southern, half of the country. According to the census of 1910 the whole population was 3,741,971. In 1913 it was estimated to be 3,877,210. The chief cities are Zurich, Basel, Geneva, Bern and Lausanne.



LOCATION MAP
The only country of Europe except Serbia which is entirely landlocked.

The religious divisions of Switzerland follow the lines of its racial settlement, and the northern cantons are largely Protestant. The Lutheran and Calvinistic sects predominate in these sections. In the southern cantons the people are for the greater part Roman Catholics, and the farther south one travels the more frequently appear the great wooden crucifixes at turns in the road, or sheltered shrines to the Madonna on lonely mountain pathways.

Naturally, this old amalgamation of races, as well as the great variations in the nature of the surface of the land itself, does not tend to make a wholly united people with similar national characteristics. As has been said by one of its own people, Switzerland has nominally twenty-two states, but actually five hundred states, or communes, each with its own local life and customs and independent claims. There is, however, a Swiss character which the world recognizes as such. Coupled with an enthusiasm for liberty is the plain, practical good sense that enabled the Swiss to work out a stable form of government.

With the movement which gave Switzerland its freedom from Austria, the peasants on the mountain sides, wresting a bare living from their "alps," or mountain pastures, had little to do. They were benumbed spiritually and intellectually by the intense hardship of their lives, and were unthinking, subservient vassals to the overlord who ruled them. It was the pastoral life about the shores of Lake Lucerne which produced a race of men able to organize a peasant army and lead it to victory against the army of an empire. Even to-day the peasants who inhabit the highland villages have continually a severe struggle to gain a livelihood. They have not only the nature of the ground and the long, cold winters to contend with, but are in constant danger from avalanches which may wipe out whole communities within a few minutes. Yet these Swiss men and women accept their fate with stoical fortitude, and refuse to move away from the farms which their forefathers have possessed for generations.

COMPARATIVE AREAS
Switzerland is about as large as Massachusetts, Connecticut and two Rhode Islands.

In the valley of the Vorder-Rhine grain is cultivated at the highest known elevation in Europe. This is near the village of Tschamut, 5,400 feet above the level of the sea. The grain is rye, and the growing season is so short that the peasants have erected a rude but ingenious drying apparatus in the fields, so they will not have to depend upon the inconstant sun to dry their harvests. But there are many

communities which do not depend even upon rye, but gain their entire subsistence from the alps, or mountain pastures, where they feed their cattle during the short summer months. In the highest of these communities snow commonly falls in June and the cultivation of corn is impossible. Even a few patches of potatoes are ripened only with difficulty. Though the peasants are nominally owners of their lands, these are always mortgaged, and a landowner is usually paying interest on loans contracted by his father.

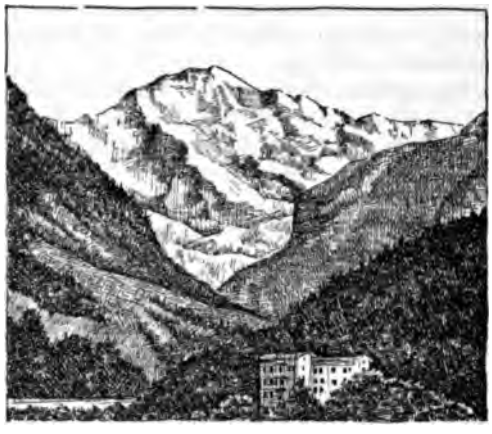
Naturally, these simple people, shut off from the world, with only arduous toil in their lives, know little of what goes on at the other side of their mountains. The women work in the fields with the men; the boys and girls receive only a simple schooling from the village priest, but are early schooled in unceasing labor. In all such villages which are of the Roman Catholic faith quaint little images are set up to invoke the aid of the saint against the terrors of avalanche and glacier. In many places earthworks and ridges of stone have been built to divert the direction of the avalanche from the community, should it by chance descend upon them.

The Swiss guides form a class which interests travelers. These men offer their services as guides for mountain climbers. They are hardy and brave, and at the same time are extremely cautious. This occupation, like that of the peasants, is handed down from father to son, so a climbing party may have among its guides "old Peter" and "young Peter," both experienced mountaineers.

Climate, Plant and Animal Life. The variations in altitude in Switzerland cause corresponding variations in climate and in the character of the vegetable life. In the valleys and on the lower mountain slopes olives, beeches, oaks, pines and firs grow. Higher up are the mountain pastures and rhododendrons, and above them come the eternal snows. On the central plain there is an average annual rainfall of thirty-three inches, but in the higher regions the precipitation is much greater. The most remarkable prevailing wind is a hot, dry southwest or south wind called the *föhn,* which occurs most frequently in spring. On the whole, the climate is healthful, though not particularly favorable to agriculture.

Game is no longer abundant in Switzerland, though the chamois and ibex are still found high up the mountains. The chief game birds are grouse, partridge and snipe.

Production and Industries. Over one-fourth of the total area of Switzerland is nonproductive; of the productive area over thirty-five per cent is grass and pasture land, and twenty-nine per cent forested country. The Swiss successfully cultivate rye, oats and potatoes, and nuts, olives and grapes are produced in favorable places along the lakes and on the southern slopes of the mountains, but the great



THE JUNGFRAU

One of the famous peaks of the world, and generally regarded as Switzerland's most beautiful mountain. It rises over two and a half miles above sea level.

proportion of the food supplies of the country must be imported. By far the most important agricultural products are cheese and condensed milk. Cattle lead in number and importance among the domestic animals, and goats, reared for their milk, skins and flesh, come next in order. The lakes are important fishing grounds.

Though hampered by a scarcity of coal and iron, the Swiss have made remarkable progress in manufacturing. Their cotton fabrics are known the world over for their excellent quality, and their machine-made laces and embroideries are likewise famous. Silk ribbons made by the Swiss are among the best to be had, and Swiss watches, jewelry and music boxes find their way into the markets of all the world. Wood carving, straw plaiting and the manufacture of leather goods, woolen goods and machinery are also important. The chief manufacturing cantons are Zurich, Glarus, Saint Gall, Appenzell, Neuchâtel, Basel and Geneva.

The discovery that tuberculosis could be cured in dry, cold, clear air, as well as in a southern climate, is one of the factors in the development of Switzerland as a health resort. Sanitariums have been built at several points, and the hot springs and salt and mineral baths

in Bern, Baden and Schaffhausen draw numerous travelers to those places. Lured by the magnificent scenery, many tourists go annually to Switzerland, thus increasing its prosperity.

Transportation. Switzerland has practically no navigable rivers, as the streams have very rapid currents, but there are about 3,530 miles of railway in the republic. There are five main railroad systems, all owned and operated by the national government. There is also a network of carriage roads, and these are kept in admirable condition.

Government. Switzerland is a confederation of twenty-two cantons, three of which, Basel, Appenzell and Unterwalden, are politically divided into two half-cantons each. Four are called Forest Cantons, namely Schwyz, Uri, Unterwalden and Lucerne. They are grouped about Lake Lucerne. As Schwyz was the most prominent in the war for freedom, and members of the confederacy for independence were known to the outside world as Switzers, this canton ultimately gave its name to the entire league. Each canton has its own constitution and local government, and is divided for administrative purposes into districts. The districts are in turn divided into communes. In nearly all of the cantons the principle of the initiative and the referendum is successfully applied. The Swiss cantons are republics in miniature, having extensive powers in local affairs.

The capital of the Swiss confederation is Bern. The executive power is vested in a Federal Council of seven members elected for a term of three years by the two houses of the Federal Legislature, or Assembly. There are seven departments of administration, each department being under the control of one member of the Council. The president of the Council, chosen by the Council members for a term of one year, is also President of the confederation. The relations of the Council to the Legislature are somewhat the same as those of the Cabinet of Great Britain to Parliament.

The two houses of the Legislature are the National Council and the Council of Estates, the Swiss names for these bodies being *Nationalrat* and *Ständerat*. The Council of Estates is composed of two members from each canton, whose terms vary from one to four years. Each canton regulates the tenure of office, salary and qualifications of its own representatives. The National Council is made up of members chosen for three-year terms by direct universal suffrage, the membership being apportioned on the basis of one deputy to every 20,000 souls. By virtue of the initiative and referendum, the people may draw up and present to the Legislature measures they wish to have enacted into law.

Defense. The Swiss military system, embodying the principle of universal liability to service, is famous. Instead of a standing army, there is a national militia of the republic, composed of its male citizens, who are trained to defend the country against invasion. All males between the ages of twenty and forty-eight are liable to military service, with the exception of certain Federal employees, clergymen, teachers and policemen, and those who are disqualified for physical reasons. The excused or rejected must pay certain special taxes. The first twelve years are spent in the first line, or *Auszug*, the following eight in the *Landwehr*, and the next eight in the *Landsturm*. (Cavalrymen serve eleven years in the Auszug and twelve in the Landwehr.) During their first year in the service the men are trained in special recruit schools, and at the end of the term each one takes home his equipment and arms. These he must keep in good condition. After the first year men in the first line are called out six times for about two weeks of service. In the Landwehr they are called out but once, and then for a period of eleven days. Each man must report to the military authorities every year in which he is not in active service. The Landsturm consists only of men who have undergone some training. The unarmed Landsturm comprises all other men between the ages of twenty and fifty who can be used for various kinds of noncombatant duties.

Education. Elementary education is obligatory in all of the cantons, but the law is most rigidly enforced in the Protestant communities. The percentage of illiteracy among men eligible for military service is very low, only one out of one thousand being unable to read. There are seven universities in the country, at Basel, Zurich, Bern, Geneva, Lausanne, Fribourg and Neuchâtel. The Federal government maintains a polytechnic school at Zurich.

History. The country in Roman times was the home of the Helvetians and the Rhaetians, who at different times were conquered by Roman armies. During the German invasions Switzerland was occupied by the Alemanni and the Burgundians, and eventually the whole country became a part of the empire of the Franks. In the eleventh century it came under the rule of the German emperors, and so be-

SWITZERLAND

Mountain Climbing

Swiss Arms

The Swiss Peasants Live in Surroundings Such as These

came a part of the Holy Roman Empire. Late in the thirteenth century the House of Hapsburg, the imperial dynasty of Austria, became very powerful in the country. The tyranny of the Austrian rulers led to the formation, in 1291, of a league of three Forest Cantons—Uri, Schwyz and Unterwalden. These cantons entered into a perpetual alliance to resist Austrian oppression, and this union was the first step in the war for Swiss independence.

The annals of this period abound in tales of heroism. Typical of the spirit of the time, though perhaps not historically accurate, is the story of William Tell. In 1315 the first blow for liberty was struck when the confederation decisively defeated the Austrians at the Battle of Morgarten. This victory gave the Swiss seventy years of peace.

Meantime Lucerne, Zurich (center of a powerful coalition), Glarus, Zug and Bern joined the confederation, and the united cantons were able to present a strong front against the Austrians when war was renewed in 1386. At Sempach (1386), where Arnold Winkelried "made way for liberty and died," and at Näfels (1388) the Swiss were completely victorious, and Austrian power was permanently weakened.

In 1415 the cantons began offensive warfare, compelling Austria to reliquish Aargau, and about half a century later they added Thurgau to their country. Then followed a war with Charles the Bold of Burgundy, in which the Swiss were again victorious. In 1481 the confederation was strengthened by the addition of the towns of Fribourg and Solothurn. Seventeen years later (1498) the Emperor Maximilian I began a war to place the Swiss again under the rule of the Empire, but the cantons held their ground in six desperate battles. Though they were practically independent from this time on, their independence was not formally recognized until 1648, when the Peace of Westphalia was ratified. In 1501 Basel and Schaffhausen came into the confederation, and in 1513 Appenzell was admitted.

The Protestant Reformation, which began in Germany in this period, soon made itself felt in Switzerland, and the cantons were involved in religious wars in the sixteenth century. Through the influence of Zwingli and of Calvin, the latter of whom made Geneva his headquarters, Protestant doctrines spread rapidly through the country; difficulties between opposing factions were partially adjusted by the Peace of Westphalia, which closed the Thirty Years' War.

During the remainder of the seventeenth century and for many years thereafter Switzerland was torn by political and religious disorders, and in 1798 a short-lived Helvetic republic was founded to take the place of the old confederation. In 1803 a new confederation of nineteen cantons was organized by Napoleon, and for a time peace and order prevailed. When the affairs of troubled Europe were settled in 1814-1815 by the Congress of Vienna, the powers acknowledged the independence of Switzerland and guaranteed its perpetual neutrality. A confederation of twenty-two cantons was organized (three being divided into half-cantons). It was not until 1848, however, that a really efficient form of government was established. In 1874 the constitution was revised, and more extensive powers were granted the central government.

Since that date Switzerland has made rapid progress. During the War of the Nations the country maintained its neutrality successfully, though often under great difficulties. The Swiss embassy took charge of American interests with respect to Germany when the United States severed diplomatic relations with the Imperial German government. B.M.W.

Consult Story's *Swiss Life in Town and Country;* Wade's *Our Little Swiss Cousins;* Crawford's *Switzerland of To-day.*

Related Subjects. The following articles in these volumes will give added details as to the geography and life of Switzerland:

CITIES

Altdorf
Basel
Bern
Geneva
Interlaken
Lausanne
Lucerne, subhead under *Lucerne, Lake of*
Neuchâtel
Zurich

HISTORY

Calvin, John
Helvetii
Holy Roman Empire
Reformation
Tell, William
Thirty Years' War
Winkelried, Arnold
Zwingli, Ulrich

LAKES

Constance, Lake
Geneva, Lake
Lucerne, Lake of
Lugano, Lake of
Maggiore, Lake
Neuchâtel, subhead *Lake of Neuchâtel*

MOUNTAINS

Alps
Jungfrau
Matterhorn
Mont Blanc
Monte Rosa
Saint Gotthard

RIVERS

Rhine
Rhone

UNCLASSIFIED

Avalanche
Chillon
Glacier
Mer de Glace
Saint Bernard, Great
Simplon

OUTLINE AND QUESTIONS ON SWITZERLAND

Outline

I. Location

(1) Latitude, 45° 49′ 2″ to 47° 48′ 32″ north
(2) Longitude, 5° 57′ 26″ to 10° 29′ 40″ east
(3) Relation to other countries
(4) Absence of seacoast

II. Size

(1) Actual area, 15,976 square miles
(2) Area compared with that of states and other countries

III. Geographic Features

(1) Most mountainous country in Europe
(2) Rivers
(3) Lakes
(4) Climate
(5) Plant and animal life

IV. The People

(1) Population
(2) Chief cities
(3) Racial strains
(4) Dominant characteristics
(5) Division according to religion
(6) Struggle for livelihood
(7) Education

V. Industries and Resources

(1) Agriculture
  (a) Adverse conditions
  (b) Highest known elevations in Europe where grain is grown
  (c) Chief crops
  (d) Stock raising and dairying
(2) Manufactures
(3) Scenery and climate as resources
(4) Transportation

VI. Government and History

(1) Confederation
(2) Defense
  (a) Universal liability to military service

VII. History

(1) The early days
(2) Under the Holy Roman Empire
(3) Under the House of Hapsburg
(4) The struggle for independence
(5) The Reformation
(6) The period of internal troubles
(7) Establishment of a stable government
(8) Switzerland and the War of the Nations

Questions

How many languages are spoken in this little country? Which of these are spreading?

What is the drop of the highest of Swiss waterfalls? How does this compare with the drop of Niagara?

What famous poem celebrates a castle in Switzerland? Where is this castle located?

Why would you not be likely to have as your guide in mountain climbing the son of a Swiss peasant farmer?

Where is the highest elevation on the continent where grain is raised? To what measures do the farmers have to resort to dry their crops? Why?

Who "made way for liberty, and died," and how did he do it? Name another famous Swiss patriot and tell what he did.

What is the tallest mountain entirely within Switzerland?

What difficulties do the mountain peasants meet? What constant danger do they face?

What special part did the three Forest Cantons play in the history of the country?

In what sense may this little country be said to have five hundred states?

In what sense may Switzerland be called the "playground of Europe," and in what sense is that name wrongly applied?

SWORD, *sohrd,* one of the most ancient of all weapons of offense and defense. The origin of this weapon is lost in remote antiquity. As soon as the art of working metals was discovered the ingenuity of man was turned towards the manufacture of destructive weapons. The earliest forms of swords of which authentic information is available were those of the Assyrians, Gauls and Greeks. The swords used by these people were made of bronze, and were short, two-edged weapons. The Roman sword, a terrible weapon in the hands of trained legionaries, was of steel, short and straight, with a sharpened point and two cutting edges.

The invention of gunpowder, which caused defensive armor to be discarded, had the effect of lightening swords, as a heavy blow was no longer necessary. The light rapier, which became the recognized dueling weapon, would not resist the blow of a heavy sword, yet against opponents similarly armed was an effective and deadly weapon. High art was exercised in the tempering of rapier blades, Toledo, Spain, becoming famous for the fine quality of its product. The favorite weapon of the East was the scimitar, a blade with a pronounced curve. Damascus was noted for its scimitar blades. The long sword of the Japanese is thirty to thirty-six inches in length, with a heavy, one-edged blade and a round hand guard. The samurai of old carried a second sword, about half the length of the long sword.

The swords of modern armies are more or less alike, differing only in minor details of weight and length. The French cavalryman carries a straight sword with a blade thirty-six inches in length, weighing two pounds six ounces. The German cavalry sword is heavier, weighing two pounds eight and one-half ounces, with a length of thirty-two and one-half inches. The British cavalryman carries a sword thirty-five and one-eighth inches long, weighing two pounds thirteen and one-half ounces. In the United States army the sword proper has given place to the saber, which is designed for both cutting and thrusting and is thirty, thirty-two and thirty-four inches in length.

The sword has been a favorite figure of speech to denote strife and conflict since man first began to regard the growth of civilization. "He that liveth by the sword shall perish by the sword" has a lesson for civil life as truly as for the military. The Hebrew prophets sought to have the swords of the nation turned into plowshares, while the New Testament speaks of the "sword of the Spirit."

The Sword in Modern War. At the commencement of the War of the Nations in 1914 the old controversy between lance and sword was revived. Many noted leaders of cavalry declared the lance to be the only effective weapon for cavalry, while others defended the sword as superior both for offense and defense. Experience proved, however, that there was little opportunity for use of the sword in that war. There was practically no cavalry action, and the best weapon for the intrepid charge was the bayonet, which all soldiers were taught to use with deadly precision. F.ST.A.

SWORDFISH, *sohrd'fish,* a species of ocean fish having a long, flattened upper jaw that resembles the weapon from which it derives its name. The swordfish is allied to the mackerels. Though found most commonly in the Atlantic Ocean, it occurs also in the Pacific, and occasionally is seen in the neighborhood of the Santa Barbara Islands, Southern California. The average length of a swordfish is seven feet, and the weight is about 250 pounds, but larger specimens have been caught which weigh 600 or 800 pounds.

Their "swords," sharp-edged and strong, and half as long as the body, are powerful weapons, capable of driving into the side of any sailboat or rowboat. Fishermen enjoy capturing these fish because they are such game fighters. Off the New England coast from 3,000 to 6,000 are caught a year, chiefly by harpooning. The flesh is coarse, but it has a good flavor. Swordfish prey upon menhaden, herring, mackerel and other fish that travel in schools. These they kill by striking out to the left and right with their swords.

SYCAMORE, *sik'a mohr,* an attractive shade tree of the plane tree family, whose hard, reddish-brown wood is used in making furniture and various kinds of woodwork. It is found abundantly in fertile bottom lands and along streams, and is distributed from Southern Maine to the north shore of Lake Ontario, west to Minnesota and Nebraska, and as far south as Texas and Florida. This tree grows from seventy-five to one hundred and fifty feet high. On

SYCAMORE LEAF AND SEED POD

the lower trunk its bark is a dark reddish-brown and on the limbs an olive-green. The bark on the branches breaks off in small scales, exposing an inner bark of light color and giving an effect expressed in the familiar phrase—"hoary antlered sycamore."

The broad leaves, which furnish delightful shade, are yellow-green with a pale lining, and have irregularly-cut margins and prominent veins. There are two kinds of flowers, those bearing stamens and those bearing pistils. The former are a deep red and the latter a pale green with a tinge of red. They open in May, when the leaves unfold. The fruit of the sycamore is a dry seed ball, which hangs from a flexible stem. Other names for this tree are *buttonwood* and *American plane tree.*

SYDENHAM, *sid'en am,* CHARLES EDWARD POULETT THOMSON, First Baron (1799-1841), a British statesman and colonial administrator, Governor-General of Canada from 1839 to 1841. After a distinguished career in England he was sent to Canada to bring about the legislative union of Upper and Lower Canada, a duty which he fulfilled with very general satisfaction. As a reward, in 1840 he was created Baron Sydenham of Kent and Toronto, but lived only a year to enjoy this new honor, for he died at Kingston, Ont., in September, 1841, as the result of an accident.

Sydenham, or Poulett Thomson as he was better known, was born at Wimbledon, Surrey, England. From 1815 to 1817, and again from 1821 to 1823, he was in Petrograd on business for his father, a London merchant, and in 1823 he became associated with the London office. Before long, however, his Liberal connections drew him into politics. In 1826 he was elected to the House of Commons, in 1830 he entered Earl Grey's Cabinet as Vice-President of the Board of Trade, and in 1834 became President. During these years he was conspicuous as a reformer along economic lines; tariff laws tending toward free trade, banking and factory legislation, the abolition of usury laws, and commercial treaties with foreign countries were some of the many subjects which showed the marks of his work. Ill health compelled his resignation from Parliament in 1839. His sudden death came before he had developed his powers to the full, but not before he had made a place for himself in history.

SYDNEY, next to Halifax the second incorporated city and one of the larger communities in Nova Scotia. It is situated on the northeast coast of Cape Breton Island, and is the terminus of the Sydney & Louisburg Railway and of the eastern division of the Intercolonial Railway. An electric line runs to Glace Bay and Dominion, and there is regular steamship connection with all important Canadian Atlantic ports. North Sydney and Sydney Mine are on the opposite side of the harbor. Sydney is 276 miles from Halifax, 728 miles from Montreal and 2,240 miles from Liverpool, England. Population in 1911, 17,723; in 1916, estimated, 23,000.

Sydney is noted for its coal trade and for its extensive production of iron and steel. It is the commercial center, both for wholesale and retail trade, of the great coal field in Canada. The occurrence of iron ore in proximity to coal has made Sydney a manufacturing center as well, with an annual output which is now over $10,000,000 a year. The plant of the Dominion Iron & Steel Company, which cost $35,000,000 and employs 4,000 men, is the greatest industrial establishment, and among the smaller plants worthy of mention are mills and factories for the production of tar, roofing materials, pressed brick, iron castings, sheet metal, structural steel, boats and cigars. In the vicinity are found silica, gypsum, fire clay and marble, and there is also considerable timber, chiefly spruce, fir and hemlock. The city owns its water and sewerage systems, but a private company provides electric light. A.H.M.

SYDNEY, *sid'ni,* the oldest city and the chief naval station of Australia, and next to Melbourne the most important British commercial center in the southern hemisphere. It is the capital of New South Wales and occupies a beautiful site on the southern shore of Port Jackson (see map of Australia, following page 488). Sydney lies about eight miles from the entrance to the vast harbor, which is defended by several forts and batteries and is so large it is capable of sheltering all of the navies of the world. The older section of the municipality is rapidly being replaced by the streets and buildings of a fine, modern city, worthy to be compared with the capital cities of Europe and America.

The most notable structure is the building of the University of Sydney, which stands on a picturesque height in Victoria Park. It is built of sandstone, in fifteenth-century Gothic style; grouped about it are three affiliated denominational colleges. Among the fine churches are Saint Mary's Cathedral (Roman Catholic) and the Anglican Cathedral of Saint Andrew. Other important edifices are the town hall, con-

taining one of the finest organs in the world; a handsome post office in Renaissance style; and the Parliament houses and other government buildings. Sydney possesses several beautiful parks, the finest botanical gardens in Australia, the National Art Gallery, a large number of learned, educational and charitable institutions, and one of the three mints of the Commonwealth.

Local transportation is provided by an excellent system of electric tramways, owned by the government of New South Wales. The waterworks and slaughterhouses are under city control. The city is a center for the manufacture of wagons, glass, pottery, stoves, liquor, boots and shoes and other commodities. There are twenty-three miles of wharves and quays and several dry and floating docks. In 1911 the population was 112,921; including suburbs, 636,353; in 1917 it was estimated to be very close to 752,500.

SYDNEY MINES, a town in Nova Scotia, on the northeast coast of Cape Breton Island. It is in Cape Breton County, three miles north of North Sydney and eighteen miles northwest of Sydney, and is connected with these towns by the Intercolonial Railway. The Nova Scotia Steel & Coal Company also operates a railway to North Sydney. Sydney Mines is one of Nova Scotia's greatest coal-mining towns, the annual output being about a million tons. Between 3,500 and 4,000 men are constantly employed in the collieries. There are also several large, open-hearth, steel furnaces, foundries and machine shops, a blast furnace and a steel compression plant. The manufactures of the town are worth approximately $3,000,000 a year. Population in 1911, 7,470.

SYMBOL, *sim'bol,* a sign by which one knows or recognizes an object or an idea. In one sense all words are symbols. Spoken words are the symbols for objects and ideas. The letters of the alphabet are symbols for particular sounds, and these symbols are combined to form the written words which are the symbols for spoken words.

One of the most conspicuous and familiar symbols is the flag. To every person the flag of his nation means "my country." Colors have a recognized and almost universal symbolism, and so have animals. Black is almost universally the symbol of grief; white, of innocence; blue stands for sincerity and purple for royalty. A lion is the symbol of courage; a lamb of meekness; the dove and the olive branch, of peace.

Every religion has symbols, particularly pictured ones. In all ages since the crucifixion of Christ the Cross has been the recognized symbol of Christianity throughout the civilized world. The ship was an early Christian symbol which represented the Church, in which "the faithful are carried over the sea of life." The gospel writers are represented by symbols; the winged man is Saint Matthew; the winged lion is Saint Mark, the winged ox is Saint Luke and the eagle is Saint John. Other saints carry symbolic emblems by which they may be recognized—Saint Mary by a box or vase (for ointment), Saint Paul by a sword, Saint Andrew by a cross.

In mythology there are innumerable symbols, such as the trident, which is the symbol of Neptune; the peacock, of Juno; and the mirror or apple, of Venus. Neptune's trident is used in astronomy to designate the planet which bears his name. Another pictured symbol is the skull and crossbones which, according to the law, must be placed on all bottles and boxes containing poison, to represent deadly peril. It was once the emblem on the flag flying from the mast of pirate ships, white on a black ground; then, as now, it symbolized death.

All of the sciences—mathematics, chemistry, astronomy, botany and biology—have a special set of symbols for representing the different objects, elements and operations involved, which are used in place of language. Some of the symbols in astronomy are so ancient that their origin is unknown. The symbols for the principal heavenly bodies are:

Sun ☉	Mercury ☿
Venus ♀	Earth ♁ and ⊕
Moon ☽	Mars ♂
Ceres ⚳	Pallas ⚴
Juno ⚵	Vesta ⚶
Jupiter ♃	Saturn ♄
Uranus ♅	Neptune ♆

A star is represented thus, ✳.

The phases of the moon are indicated in this manner: ● new moon; ☽ moon in first quarter; ☺ full moon; ☾ moon in last quarter.

Mathematical symbols are numerous, and most of them are very familiar. First there are the symbols of value, the Arabic and Roman numerals, and the letters of the alphabet; then there are the symbols of operations, such as +, the sign of addition; −, of subtraction; ×, of multiplication; ÷, of division. The character π (pi) stands for the number 3.1416, which is used in computing the area, circum-

ference and diameter of circles; *c* stands for circumference, *d* for diameter, *v* for volume, *a* for area.

In chemistry either the first or the first two letters of its English, Latin or German name is used to designate a metal or an element. *Hg* (from the Latin) is the symbol for mercury; *Fe* (also from the Latin) is the symbol for iron. *H* stands for hydrogen and *O* for oxygen. Such a symbol not only represents an element, but it also stands for a specific quantity of that element. *O* always means sixteen parts, by weight, of oxygen; *Fe* always means 56 parts, by weight, of iron. So a chemical formula may be constructed simply by putting down the letters of the elements composing the compound. Small numerals may be added to each letter to show exactly what proportion is needed. Thus, the formula for water is H_2O; $AgCl$ represents the composition of silver chloride; $Al_2(SO_4)_3$ that of aluminum sulphate (see the article CHEMISTRY, subhead *Elements*). A.C.

SYNAGOGUE, *sin'a gog,* a place of local worship among the Jews. Supposed to have originated at the time of the Babylonian Captivity (sixth century B. C.), it was in existence wherever the Jews had settled at the time of Jesus, and continues among them to the present day.

In New Testament times the synagogue was built at the cost of the community. It was so constructed that the worshiper, on entering or at prayer, faced in the direction of Jerusalem. The furniture included a chest, known as the holy ark, in which were kept the rolls of Scripture used in the service; a lamp that burned perpetually, symbolizing the presence of Jehovah; candlesticks for use on Sabbath and feast days; a rostrum for the reader and probably a desk on which to rest the roll; seats for the elders, in front of the ark and facing the people; and seats for the congregation, the men on one side and the women on the other, divided by a screen. The ruler of the synagogue was responsible for the service, and he chose those who should take part. The elders formed the lesser Sanhedrin, a body having civil and religious authority over local cases. They were examined by members of the great Sanhedrin, but were elected by the congregation.

The Great Synagogue was a body of 120 members, probably organized at the time of Ezra and Nehemiah to define and teach the Law. It is believed to have finally determined the Old Testament canon. At a later period it became merged with the Sanhedrin (which see).

SYNDICALISM, *sin'dik al iz'm,* a condition sought in the labor world by which the day laborer shall control all industry. Just the means to be employed are difficult to state, for among men who preach syndicalism and who aim to bring it to reality there is not unanimity of opinion. Syndicalists are not looking for success through the Socialists; they do not hope for results through politics, although many of them belong to the Socialist organization. They do not wish for ownership of industry by the state unless they are strong enough to control its policies, and of this they have no present hope. They have learned to expect nothing from legislative action which will strengthen their cause. They do not even look for support in their revolutionary plans from trade unionism collectively. Syndicalism must be worked out on lines peculiarly its own, for its supporters recognize the impossibility of winning the adherence of those who believe in the existing order; those who aim to advance the great cause of labor by working along lines which are even moderately conservative, denounce syndicalism. Its foremost advocates in America are the members of the Industrial Workers of the World, the most radical labor organization ever known.

The advocates of syndicalism have therefore adopted a policy not countenanced by legal standards. By harassing their employers, the capitalists, whom they look upon as their enemies, they hope to wear them down and force them through never-ending losses to lose interest in industrial life. It is proposed to accomplish this by boycotts, strikes, and particularly by sabotage. When the capitalists are weakened and in despair it is their purpose to inaugurate a vast strike and in one supreme effort overturn the present system and themselves take possession of all industry.

It is the hope of the syndicalists that the railway workers shall control all railroads, that miners shall control all mines, that factory workers shall run the factories, and so on through the whole industrial range. They demand all the benefits that accrue from labor. E.D.F.

Consult Brooks's *American Syndicalism;* Clay's *Syndicalism and Labour.*

Related Subjects. The following articles may be consulted in this connection:

Capital
Labor Organizations
Sabotage
Socialism
Strike

SYNECDOCHE, *sin ek'doh ke,* a figure of speech in which a part of a thing is used for the

whole, or the whole for a part. It may be considered a form of metonymy. The expression "a fleet of forty sails" contains an example of synecdoche, *sails* being used for *ships,* or a part for a whole.

Related Subjects. For purposes of comparison the following articles in these volumes may be consulted:

Figure of Speech	Metonymy
Metaphor	Simile

SYNGE, *sing,* JOHN MILLINGTON (1871-1909), an Irish dramatist, born at Rathfarnam, near Dublin. He was graduated from Trinity College, and later is said to have wandered over Europe, a silent, poverty-stricken man in ill health. During this period he picked up numberless stories and legends among the common people which he afterwards depicted so faithfully in his plays, which he began producing in 1903.

After the completion of *Aran Islands,* and the production of several short poems, he began to write plays, the prevailing note of which was sadness, whether they were comedies or tragedies. His work has been produced with success both in Europe and in America; all the completed dramas deal with Irish peasant life, of which he gives fearless, melancholy, tragic and humorous pictures. They include *The Playboy of the Western World, The Shadow of the Glen, The Tinker's Wedding, Riders to the Sea* and *The Well of the Saints.* He was in Dublin, working on *Deirdre of the Sorrows,* at the time of his death.

SYNTAX, *sin'taks,* a division of grammar that treats of the orderly arrangement of words to form sentences and the grammatical relations of words in the sentence. *Syn* is derived from a Greek word meaning *with* or *together,* and *tax* from a word meaning *to arrange,* and these two words combined constitute a term that signifies the drawing up of an army in battle array. *Syntax* is thus an appropriate term to describe the building up of sentences, which may be described as the marshaling of words to express thought.

The relation that any word bears to the other words in the sentence is known as its *syntax* or *construction,* and when an expression is used ungrammatically we say that such use is an error in syntax. The use of a singular verb with a plural subject, for instance, as *They was here,* is an error in syntax. In the study of grammar the student learns not only how to put words together to make sentences, but he learns how to take the sentences apart—to break them up into the elements of which they are composed. The first process is known as *synthesis,* and the second as *analysis.*

Related Subjects. The various phases of this subject are discussed in detail in the articles listed below. In the articles on the parts of speech full directions are given for parsing, and the special errors in syntax connected with each part of speech are pointed out. See:

Adjective	Inflection
Adverb	Interjection
Analysis	Mode
Article	Noun
Case	Parsing
Comparison	Participle
Conjugation	Person
Conjunction	Preposition
Declension	Pronoun
Gender	Punctuation
Grammar, subhead	Sentence
Sentence-Building	Tense
Infinitive	Verb

SYRACUSE, *seer'a kuse,* a small municipality of Sicily, occupying the site of one of the most powerful cities of the ancient Grecian world. Near the close of the eighth century B. C. a band of colonists from Corinth made a settlement on the small island of Ortygia, near the Sicilian shore. The colony developed into a rapidly-growing city that soon spread over to the main island, which was connected with the islet by a causeway.

Ancient Syracuse had a long and eventful history. In the fourth century B. C., under the rule of Dionysius the Elder (which see), it became a center of Greek art and culture, and won renown because of a victorious war with Carthage. In 212 B. C., however, the city was captured by the Romans, whose fleet had been set on fire by the burning glasses of the famous mathematician Archimedes (which see). Thereafter the city gradually declined, being reduced finally to its ancient limits. Ortygia, the present site, is now a peninsula.

Modern Syracuse is the capital of a province of the same name, and has a population of about 27,000. It is interesting chiefly because of its ruins—monuments of past glory. Some Doric columns of antiquity may be seen in a cathedral erected about the ruins of a temple. The fountain of Arethusa, famed in legend, is in the southern part of Syracuse. See ARETHUSA.

SYRACUSE, N. Y., the county seat of Onondaga County, situated in the central part of the state, at the junction of the Erie and Oswego canals (see NEW YORK STATE BARGE CANAL), thirty-seven miles southeast of Oswego, 148 miles west of Albany, the state capital, and

150 miles east of Buffalo. Various branches of the New York Central and the Delaware, Lackawanna & Western railways enter the city. Through the Erie Canal, which pierces the city from east to west, there is water communication with the Hudson River and Lake Erie, and through the Oswego Canal, with Lake Ontario and the Saint Lawrence River. Six interurban lines operating from the city afford additional passenger and freight service. The population increased from 137,249 in 1910 to 155,624 in 1916 (Federal estimate), and the city ranks fourth in size in the state. The area exceeds seventeen square miles.

Syracuse is built largely on silt brought down from the Onondaga Valley, and the profuse growths of trees and shrubbery give the broad streets of the residential district a parklike appearance. The recreation grounds of the city cover about 300 acres; the largest of these is Burnet Park (123 acres). There are several squares in the city, Clinton Square and the one facing the county courthouse being especially attractive. Syracuse is the home of the state fair, which is held under the auspices of the State Agricultural Society. The Onondaga Indian Reservation is south of the city.

Buildings and Institutions. Onondaga limestone, found in immense quantities in the vicinity, is largely used in building, and the city has many examples of modern architecture. Noteworthy structures are the Federal building, the city hall, the courthouse, the state armory and a number of fine bank and office buildings. The most notable institution for advanced learning is the Syracuse University (which see), founded in 1870. Other institutions are Travis Preparatory School, Saint John's Academy (Roman Catholic), Saint John's Military School (Episcopal) and a Carnegie Library containing 150,000 volumes. The Court of Appeals Law Library, which belongs to the state, has over 35,000 volumes. There are also a Museum of Fine Arts and the Onondaga Historical Society. Syracuse is the see of a Roman Catholic bishop. Of the eighty churches in the city the First Presbyterian is the most noted. The benevolent institutions include the Good Shepherd, Saint Mary's and Saint Joseph's hospitals, a home for aged women, orphan asylums and a state institution for feeble-minded children. The Onondaga Penitentiary is at Jamesville, five miles southeast of Syracuse.

Commerce and Industry. Formerly the production of salt was the leading industry of Syracuse, and it maintained more than half of the population. Of late years Warsaw, N. Y., and Manistee, Mich., have taken the lead in salt production, and the Syracuse industry is of secondary importance. One of the leading manufacturing establishments is the factory of the Solvay Process Company, where about 3,000 men are employed in making soda ash, bicarbonate of soda, caustic soda, tar, ammonia, carbolic acid, picric acid and coal-tar products. The brine used by this company is brought through iron pipes from wells twenty miles south of the city. This plant is probably the largest of its kind in the world. The city is an important center for the manufacture of automobiles, agricultural implements, clothing, furniture and chinaware. About 15,000 people are engaged in the metal works, about 5,000 in the manufacture of chemicals and about 5,000 in the textile and clothing factories. The export trade is large.

History. The territory around Syracuse was formerly owned by the Onondaga Indians. In 1778 the state bought, by treaty, a large tract of land which contained the salt springs, and formed what was known as the Onondaga Salt Springs Reservation. The settlement of the city began in 1805, and it was known as South Salina, Bogardus' Corners, Cossitt's Corners and Milan, until it was named Syracuse, for the ancient city in Sicily. In 1825 it became a village; in 1847 it annexed Salina and was chartered as a city. Its area was enlarged by annexation in 1887 and again in 1892.

SYRACUSE UNIVERSITY, a coeducational institution under the direction of the Methodist Episcopal Church, founded at Syracuse, N. Y., in 1870. It has a number of imposing buildings, and its campus of nearly 100 acres is on an elevation commanding a superb view. The university includes the college of liberal arts, the college of fine arts, the college of medicine (successor to the Geneva Medical College), the college of law and the college of applied science, the teachers' college, the college of agriculture and the New York School of Forestry. There are also maintained a school of oratory, a library school, a school of photography and a summer school. The university athletic field covers five acres; on it is one of the finest stadiums in the United States, with a seating capacity of 20,000. The library of over 99,000 volumes includes that of the noted German historian, Leopold von Ranke, which was purchased in 1887. The faculty numbers about 315, and the student enrolment is over 4,000.

SYR-DARYA, or **SIR-DARIA**, *sir dahr'i ah*, the principal river of the province of Syr-Darya, in Russian Turkestan. It begins as a small mountain stream whose source is on the northern slope of the Tian-shan range. Flowing in a general northwesterly direction, the Syr-Darya follows a course of about 1,700 miles, finding its outlet in Lake Aral (see map of Asia, opposite page 417). For a long distance the stream flows through an arid plain, where its volume is decreased by evaporation and the drawing off of water for irrigation purposes. It is of little value for navigation.

SYRIA, *seer'i a*, a region in Asia Minor bordering on the eastern shore of the Mediterranean Sea. This land has no very important part in modern commerce and industry, and it is of little significance politically, but the name has associated with it scenes and events of imperishable fame; for the land of Syria includes the Holy Land, the birthplace of Christianity, and it was in this region that the Israelites established themselves as a nation.

Modern Syria occupies a narrow strip of country whose boundaries are approximately the same as in Bible times—the Alma Dagh range on the north, the Euphrates River and Syrian Desert of Arabia on the east, the Great Sea on the west and Egypt on the south. It constitutes a Turkish vilayet (province), and has an area of 114,530 square miles. The vilayet is divided into six local governments, Aleppo, Zor, Syria, Beirut, Jerusalem and Lebanon. An official estimate gives the number of inhabitants as 3,675,100. Of these, Mohammedans are in greatest number, but there are many Christians of the Orthodox Greek Church, especially in Lebanon. Wandering Bedouins and Arabs are found in the south, and Palestine is a Jewish center. Damascus, Aleppo, Beirut and Jerusalem are the principal towns.

The country in general is a plateau which slopes abruptly toward the Mediterranean, and is divided into eastern and western table-lands by a narrow rift valley over 400 miles in length. There are several mountain ranges along the coast, the loftiest being in Lebanon. As vapor-laden winds blowing from the sea lose their moisture on the seaward slopes of the mountains, the country is in most sections too dry for agriculture. Several Jewish colonies, or agricultural communities, have been established in Palestine, and they raise cereals, cotton and fruits. These Jews have introduced a system of irrigation. Railroad and carriage-road facilities are poor, but since the outbreak of the War of the Nations the railroad system, which is controlled by the Ottoman Empire, has been extended to within less than 200 miles of the Suez Canal.

Related Subjects. For further information on this subject the reader is referred to the following articles in these volumes:

Aleppo	Jerusalem
Arabs	Jews
Bedouins	Lebanon, Mountains of
Beirut	Palestine
Damascus	Turkey
Jaffa	

SYRIAC, *seer'i ak*, one of the two dialects of Aramaic, the other being the so-called Chaldee. Syriac was spoken in Mesopotamia, and has literary monuments which date as far back as the first century of the Christian era. The oldest existing writing is a translation of the Old Testament, and most of the early manuscripts are versions of some part of the Bible. Down to the fourteenth century the language had a vigorous life.

From the fourteenth century it declined, but to the present time there remain in the Kurdish mountains and neighboring localities tribes who speak a language called Syriac. This differs considerably from Syriac proper.

SYRINGA, *si ring'ga*, a genus of large, hardy shrubs of the olive family, including the lilacs and jasmine, whose fragrant flowers make them popular as garden plants. In some species, as the lilacs, the individual flowers are small, but are borne in large clusters at the ends of the plant stems. One species, common in the southeastern part of the United States, bears large, white, single flowers. The mock orange is sometimes called syringa.

SZEGEDIN, *seg'ed een*, an important city of Hungary, the second in population, ranking next to Budapest. It is the capital of the County of Csongrád, and is situated on the west bank of the Theiss River, 118 miles southeast of Budapest (see map of Europe, following page 2092). It is the commercial center of a fertile agricultural region, and carries on a prosperous trade in grain, wool and tobacco. Since a disastrous flood, which occurred in 1879, Szegedin has been rebuilt into a fine, modern city, with broad, circular avenues, beautiful public squares and stately public buildings. Fine quays extend along the river and a dam has been erected to prevent further damage to the city. Szegedin is noted for its soap and various food products, such as Hungarian pepper (paprika) and a dough preparation called *tarhonya*. Population in 1910, 118,328.

THE WORLD BOOK
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Tt

T is the twentieth letter in the English alphabet, derived from the twenty-second and last of the Phoenician alphabet. This was the *tav,* or *mark,* which had practically the same value as the Greek *tau* and the English *t,* and was made much like a capital *T,* except that the vertical line extended through the crossbar. *T* is more closely related to *d* than to any other letter, and the two are often confused and used interchangeably in allied languages. In English, *t* has only one regular sound, but taken in connection with *i* it is often pronounced like *sh,* providing another vowel follows the *i* in the same syllable, as in *partial.* The Anglo-Saxons, when they adopted the alphabet from the Romans, added two letters, one of which was called *thorn,* and had the sound of *th.* It was shaped very much like a capital *Y,* and probably because confusion arose from the likeness, the letter was later dropped and the combination *th* substituted for it. This digraph, as it is called, is pronounced in two ways—as in *think* or *breath,* and as in *their* or *breathe.*

TABER, *ta'bur,* a town in the extreme southern part of Alberta. It is noted for its many coal mines, which employ 500 to 600 men and have a daily output of 1,000 to 1,500 tons. Taber is on the Crow's Nest Pass branch of the Canadian Pacific, thirty-two miles east of Lethbridge and eighty-four miles by rail west of Medicine Hat. In addition to coal Taber is a shipping point for large quantities of grain raised in the vicinity, and its elevators have a capacity of 100,000 bushels. Several schools, one costing $80,000, and the fine building of the Canadian Bank of Commerce, erected in 1913, are features of the town. It was founded and incorporated in 1906. Population in 1911, 1,400; in 1916, estimated, over 2,000.

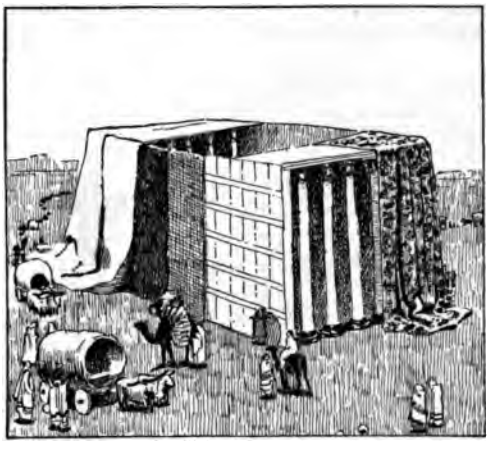
TABERNACLE, *tab'er nak'l,* or **TENT OF MEETING,** the center of worship of the Israelites during their wanderings in the wilderness. Moses received instructions while on Mount Sinai for its erection (*Exodus* XXVI, 30), and the materials were provided by the free offerings of the people. It was dedicated on the first day of the second year after the Exodus from Egypt.

The tabernacle was fifteen feet long, fifteen feet wide and fifteen feet high. Its framework was of acacia boards, overlaid with fine gold. The ceiling was of curtains of white linen, interwoven with blue, purple and scarlet cherubim. Above this was a curtain of goats' hair and outside of all a covering of skins. The interior was divided by the "veil," a curtain of linen similar to those of the ceiling, into the *Holy of Holies* and the *Holy Place.* The Holy of Holies contained the Ark of the Covenant, in which were kept the Tables of the Law, the pot of manna and Aaron's rod that budded. Above the ark was the "mercy seat," a cover of solid gold, surmounted by two golden cherubim. In the Holy Place were the table of shewbread, the altar of incense and the golden candlestick.

The tabernacle stood within a court, 150 feet long and seventy-five feet wide, enclosed by rich curtains and supported by brass pillars. It opened toward the east, and before it stood the altar of burnt offering, where the people brought their sacrifices to be offered by the priests. There was also a laver, where the priests washed their hands and feet before entering the Holy Place.

The tabernacle and its furnishings were so constructed as to be easily portable. It was in

the care of the Levites, who camped round about it. Above it hovered the pillar of cloud by day and the pillar of fire by night; these were the signs of Jehovah's presence. After the conquest of Canaan the tabernacle was set



ERECTING THE TABERNACLE
(Drawn from illustration in *Story of the Bible.*)

up at Shiloh and afterward removed to Nob and then to Gibeon. From the latter place it was brought to Jerusalem at the time of the dedication of Solomon's Temple, probably being preserved as a relic within the Temple walls. See TEMPLE.

Consult Kennedy's "Tabernacle," in Hastings' *Dictionary of the Bible.*

TABERNACLES, FEAST OF, an autumn festival of the Hebrews of Biblical days, lasting seven days, during which the people lived in booths, in commemoration of the time when their forefathers dwelt in tents in the wilderness. It also celebrated the ingathering of the harvest (*Deut.* XVI, 13). The dedication of the Temple by Solomon was held at the time of the Feast of Tabernacles (*I Kings,* VIII, 65), its length, on this occasion, being extended seven days. After the Exile, a number of rites were added, such as the ceremony of the waving of palms, the libation of water, etc. As at the Feast of Weeks and the Passover, all males were required to be present at the sanctuary during this feast. Following the final destruction of the Temple, the rabbis ordered its celebration continued at the individual synagogues, and it is thus celebrated by the Jews to the present day.

TABOO, *ta boo',* also spelled TABU, a word of Polynesian derivation which has made its way into the current speech of civilized peoples, by whom it is employed with much the same meaning as *exclude* or *ostracize.* It is used as a noun, verb or adjective, as in the following sentences:

A taboo is placed on profanity among the Boy Scouts.

The legislature will taboo any member accepting a bribe.

Coarse manners are taboo.

The practice of taboo among the Polynesians and various other primitive peoples consists in setting apart certain objects as unclean or sacred or as having the power to injure. Such objects must not be touched. This custom prevails among tribes in America, Africa, Central Asia and India, and has a counterpart in certain religious practices of the Greeks, Romans and Jews.

Taboo takes various forms. There are taboos of foreigners, of innovations, of burial grounds, of parts of one's person, of objects set apart for kings, chiefs and priests, of sick persons, of sorcerers, and so on indefinitely. Taboo objects are marked by various methods, such as using a piece of white cloth, a stick with dry leaves or a bundle of branches painted red and white. The numerous restrictions imposed by the old Hebrew law in regard to sacred and unclean things were in effect examples of taboo.

TABOR, *ta'ber,* MOUNT, a mountain of Northern Palestine, which is conspicuous by reason of its isolation rather than because of its size. Rising abruptly to a height of about 1,000 feet above the plain of Esdraelon, it stands, a wooded, shapely cone, a landmark through all Galilee. The roads to the top lead through groves and thickets of oak, walnut and roses, in which wolves, foxes and other wild animals find hiding places, but the steepness and perhaps danger of the ascent are compensated for by the beautiful view to be obtained from the summit. All Galilee, Samaria and Perea lie spread out before the eye, with their villages, cultivated fields and water courses.

Like most other mountains of the Holy Land, Tabor was early looked upon as a sacred spot. The Old Testament refers to it as the site of a sanctuary, and as the place to which Barak summoned his forces for the desperate conflict with Sisera (*Judges* IV). As it was but seven miles from Nazareth, the boyhood home of Jesus, it must have been a familiar spot to Him, yet the New Testament makes no mention of it. The early Christians looked upon it as the mount of Christ's transfiguration, and built upon it churches and monasteries, but research has proved that during all the period of

Christ's life, and for centuries before, a fortified town occupied the summit.

TABRIZ, *ta breez'*, the most important commercial center of Northwestern Persia, the second largest city of the country, ranking next to Teheran. It is the capital of the province of Azerbaijan, and is situated about thirty-five miles east of Lake Urumiah, at an elevation of 4,500 feet above sea level. Its original importance and population have been greatly affected by numerous violent earthquakes. The inner portion of the city is unattractive, despite its well-stocked bazars and many mosques, but the outlying quarters have beautiful gardens and orchards. Before the Caspian Sea became the commercial highway of the territory, Tabriz was the trade center for Persia, India and the Turkish and Russian dominions. There is still a good trade in rugs, shawls and dried fruits, and the rugs of Tabriz are among the finest produced by a country famous for this industry (see CARPETS AND RUGS).

Tabriz is the residence of a bishop of the Gregorian National Armenians and has five Armenian churches. There is a military college here, and the city is the headquarters of a branch of the Imperial Bank of Persia. It is connected with Julfa, on the Russian frontier, by a railroad, which was opened in 1916. During the War of the Nations the place was captured in turn by the Turks and the Russians.

TACHÉ, *ta shay'*, ALEXANDER ANTONIN (1823-1894), a Canadian churchman, Roman Catholic archbishop of Manitoba, a man who wielded a greater influence over the Indians and half-breeds of the Northwest than any man has wielded either before or since his time. For forty years he labored among them, with the result that he stands without a rival in his field.

ARCHBISHOP TACHÉ

Archbishop Taché was born at Rivière du Loup, Que. He received a good education at Saint Hyacinthe College, Montreal Theological Seminary and Chambly College, and then in 1842 became instructor of mathematics in Saint Hyacinthe College. Two years later, however, he resigned to become a novice in the Order of the Oblate Fathers. Taché was a great-great-grandson of Louis Joliet, and in his veins coursed the blood of the Sieur Varennes de la Verandrye. With such ancestors Taché was naturally a man to break a new path. He volunteered for missionary service among the Indians in the Red River district, and after an arduous overland journey of two months reached Saint Boniface in August, 1845.

Three months after his arrival at Saint Boniface, Taché was ordained a priest. Thereafter, except for a year spent in France, Saint Boniface was his home. He became known throughout the West for the long journeys he made, for his courage and zeal, and as the result of these traits had a remarkable influence over the Indians. In 1851 he was summoned to France for promotion by the Superior of the Oblate Fathers, but after a year was allowed to return to Canada and in 1853 was created bishop of Saint Boniface.

During the troubled period which preceded the formation of Manitoba as a province, the bishop urged upon the Dominion government the necessity of adjusting the grievances of the Indians and half-breeds. Had his advice been followed the Red River Rebellion might have been averted. As it was, when the trouble came, he was in Rome, but he hurried home, too late to prevent bloodshed but still in time to help in the settlement. In 1871 Saint Boniface was made a metropolitan see, and Taché became the first archbishop. He died at Winnipeg, and was buried in the cathedral at Saint Boniface.

Consult Dent's *Canadian Portrait Gallery.*

TACHÉ, SIR ETIENNE PASCAL (1795-1865), a Canadian statesman, twice Premier of Canada and chairman of the Quebec Conference at which the terms of Confederation were agreed upon. Taché was born at Saint Thomas, Que. Although his schooling was not finished, he enlisted in the Canadian militia in 1812 and served throughout the War of 1812. At its close he studied medicine, and in 1819 was admitted to practice. He remained in active practice until 1841, when he entered the Canadian Assembly. He resigned in 1846 to become deputy adjutant-general of the Canadian militia, but in 1848 again entered the Assembly and in March of that year became Commissioner of Public Works in the Baldwin-Lafontaine Ministry. From 1849 to 1851 and again from 1852 to 1856 he was Receiver-General. In the latter year he was appointed speaker and a life member of the legislative council, and by the end of the year he became Premier in the first Taché-Macdonald Ministry. In 1864 Taché

and Sir John Macdonald again formed a Ministry with the former as Premier, but in both ministries Macdonald was the real head of the government. Taché was knighted in 1858.

TACITUS, *tas'i tus,* PUBLIUS CORNELIUS (about 55-120), a Roman historian, one of the greatest of all ages. Of his life nothing is known except what may be learned from his occasional references to himself and from a series of letters written to him by his intimate friend, the younger Pliny. These sources tell us only that he held various public offices under Vespasian, Titus, Domitian and Nerva, that he won a reputation as an orator and lawyer, and that he married the daughter of Gnaeus Julius Agricola. His alliance with this distinguished soldier and statesman probably had an influence in procuring his various promotions in office.

Of the writings of Tacitus there remain the discussion of eloquence, *Dialogue on Orators,* his first work, published early in life, and by some critics believed not to be genuine because it contains few of the distinctive mannerisms of Tacitus; the *Agricola,* a biography of his father-in-law, universally acknowledged to be a masterpiece; the *Germania,* a description of the institutions and customs of the various German tribes, written, it has been thought, to serve a political purpose by calling the attention of the Romans to the possible danger from these neighbors; the *Histories,* of which there remain only the first four books and a part of the fifth, giving an account of the years 69-70; and the *Annals,* which originally consisted of sixteen books, giving the history of Rome and its provinces from the death of Augustus to that of Nero, but of which books seven to ten inclusive, with parts of others, are lost.

Consult Dimsdale's *A History of Latin Literature.* Translations of the *Dialogues, Agricola* and *Germania* may be had in the Loeb Classical Library.

TACKING. See SAILBOAT AND SAILING.

TACOMA, *ta ko'ma,* WASH., the county seat of Pierce County, is a seaport on Commencement Bay, an inlet of Puget Sound, and the center of an important lumber industry. It is in the west-central part of the state, twenty-eight miles south of Seattle and 140 miles north of Portland, Ore. The Puyallus River flows through the city and empties into the bay, which expands into an excellent harbor. Tacoma is the western headquarters and terminus of the Northern Pacific Railway. Railroads entering the city are the Chicago, Milwaukee & Saint Paul, the Great Northern, the Oregon and Washington Railroad & Navigation Company and the Tacoma Eastern. The city is growing very rapidly. In 1910 it had a population of 83,743; this had increased to 112,770 in 1916 (Federal estimate).

Tacoma occupies an uneven, picturesque site of about forty square miles. The land rises from the level of the river to a height of several hundred feet, and the greater part of the city is built upon a plateau about 200 feet above the bay. On the west are the Olympic Mountains and on the east the Cascades, both of which are ranges of snowy peaks and pine-covered slopes. Tacoma is the gateway to Mount Rainier National Park, to the southeast, a region yearly attracting thousands of visitors (see RAINIER, MOUNT). The largest parks of the city are Point Defiance (640 acres), Wright (28 acres) and McKinley (31 acres). The Federal building, courthouse, city hall, Carnegie Library and the Chamber of Commerce are important buildings. The State Historical Society and Terry Museum of Art occupy rooms in the public library. Tacoma has the Whitworth College (Presbyterian), the University of Puget Sound (Methodist Episcopal), the Annie Wright Seminary (Protestant Episcopal), the Pacific Lutheran University and an Indian school. The city contains a number of hos-

pitals, the largest of which are the city and county, Saint Joseph's and the Fanny Paddock Memorial hospitals. A short distance south is the Washington Hospital for the Insane.

Extensive tracks of timber, coal mines, a fertile adjacent agricultural territory, facilities for manufacturing, and domestic and foreign trade all contribute to the industrial importance of Tacoma. It is a seaport whose ships trade with coast cities, Europe and the Orient. A local estimate for 1916 placed the value of foreign exports at $42,000,000 and the value of the total ocean commerce at $75,000,000. Wheat, lumber, coal, fish and fruit are the chief articles of trade. The manufacture of lumber products is by far the most important industry; the lumber and woodworking plants produce an annual output worth $10,000,000. Other important industrial plants are smelters, furniture factories, flour and cereal mills and packing houses.

Old Tacoma, founded in 1868, and New Tacoma, founded about 1869, were consolidated in 1883 to form Tacoma. In 1910 the commission form of government was adopted. G.S.

TACONIC, *ta kon'ik,* **MOUNTAINS,** a range of low mountains uniting the Green Mountains of Western Vermont with the Highlands of the Hudson, and forming part of the boundary between New York and Massachusetts (see GREEN MOUNTAINS). Equinox in Vermont (3,816 feet) and Greylock in Massachusetts (3,538 feet) are the highest peaks of the range. Like the other mountains in this region, the Taconic are attractive, green-covered hills with rounded summits.

TACTICS, *tak'tiks,* the science and act of arranging and maneuvering troops on the field of battle. The object of *strategy* is to force the enemy to battle under conditions disadvantageous to him; the object of *tactics* is to win the battle by the use of all arms—infantry, cavalry and artillery. The duties and possibilities of these three branches of an army are dissimilar, but the result entirely depends on their coöperation as a whole force. As a good mechanic must thoroughly understand the tools he works with, and an engineer must know his engine, so must a commander, to be a tactician, know the limitations and possibilities of the arms under his command. Lack of such knowledge may lead to the putting of undue strain on certain parts of the army machine, or to letting great strength run to waste in other parts.

Infantry. Infantry is now, as it always has been, the principal arm of the service, and the tactical dispositions of all troops are in reality preliminaries to the final and decisive assault by infantry which is the object of every commander. Artillery of heavy type is used for many hours to clear the way and to demoralize the enemy. In attacking a position, infantry is usually marched in column (close order) until almost within range of the enemy's artillery fire, at about 3,500 or 4,000 yards, when the order to deploy or "open out" is given. Under the cover of its own artillery fire, sent over the heads of the infantry, the troops continue to advance, supports and reserves following. Taking advantage of every natural protection, the advance develops into a series of rushes, between which the infantry men lie down and deliver a rapid and concentrated fire at the enemy's position. The artillery continues to shell the position, with the object of assisting and supporting the advance and subduing the enemy's fire. With modern magazine rifles the result of such attacks is practically settled at a distance of 800 or 900 yards. Either the position is then taken by assault, or the attacking forces are repulsed.

Artillery. As already stated, artillery always prepares the way for an attack, by incessant bombardment. While the attack is proceeding, the duties of the artillery are for one section to shell the enemy's position as long as possible without endangering the advancing infantry, to watch carefully for counter attack and to shell hostile infantry with the last ounce of their strength, while another section, with a series of rushes, follows up the attacking infantry, throwing aside the need for concealment, and vigorously assisting the final assault. As a general rule it may be laid down that attacking infantry cannot succeed if their own artillery has been disabled in the preliminary duel, and the artillery could not achieve complete success unless supported by the later infantry attack.

Cavalry. Until the War of the Nations it had always been the object of the wise commander to threaten or attack the enemy's flank, and this involved the use of cavalry. Points of vantage, such as hills, woods and villages, would be seized and held to act as a screen to the movements of outflanking troops behind them. Flying machines made this secrecy impossible. At the beginning of the War of the Nations it was believed that there would be much work for cavalry units, but the system of trench warfare which immediately developed made useless that hitherto important military arm, and opened the era of big guns.

Naval Tactics. As the introduction of modern firearms has completely changed the aspect of military tactics, so has steam (combined with modern weapons) changed naval warfare. The old style wooden vessels had not only to fight but to maneuver for wind, a matter now entirely disregarded. The general principles of military tactics may be applied to naval warfare, in that the object is to oppose the enemy with a superior or better placed and maneuvered force. The development of signaling, especially the introduction of the wireless telegraph, air planes and searchlights greatly facilitated naval tactics. In the United States navy the principal battle formations are called *line, column* and *echelon.* Ships advancing abreast are said to be in line, in column when one behind the other, in echelon when advancing in a diagonal line. A *fleet* consists of two or more *squadrons* of from two to eight ships each. A *division* is half a squadron of more than five vessels belonging to a squadron or division.

In a sea fight, as in a land fight, if the line of battle be broken, an opportunity is presented to destroy the disorganized vessels, as their power is weakened when not acting in direct coöperation. Naval battles are now settled at long distances (in the Battle of Jutland, ten or eleven miles), and should vessels become separated from their line of battle, they are an easy prey to the enemy. F.ST.A.

Related Subjects. The reader is referred to the following articles in these volumes:

Army	Strategy
Navy	War of the Nations

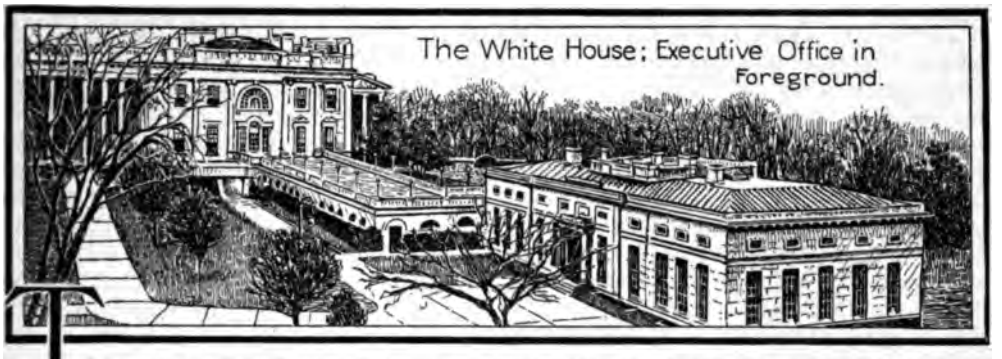
TADPOLE, *tad'pohl.* The first period in the life history of a frog or toad, after it hatches from the egg, is known as the tadpole, or larval, stage. When the creature first hatches it looks like a lump of dark jelly with a head and a tail. There are no gills, no mouth and no eyes, but on certain parts of the body there are hair-like processes which enable it to push itself forward in the water. Gills, eyes and mouth then develop, and, in the course of time, the gills are replaced by lungs, the tail is absorbed, and legs appear. These last changes mark the end of the tadpole stage and the beginning of the mature period. For illustration of tadpole and further details, see FROG.

TAFFETA, *taf'c ta,* a variety of silk fabrics, the name being derived from a Persian word *taftah,* meaning "spun" or "woven." *Taffeta* was originally used as the name of all plain silks which were made simply by alternating the threads of the warp and the woof. At various times various qualities have been ascribed to the silk called taffeta; in the sixteenth century it was "very thick and costly;" in the seventeenth it was "very soft and thin;" and about 1750 it was described as a "lustrous silk, sometimes checkered or flowered, and sometimes striped with gold and silver." In common use to-day the name is given to all *plain* silks as distinguished from corded or twilled fabrics (see WEAVING).

TAFT, LORADO (1860-), an American sculptor, teacher and lecturer on art subjects, whose genial personality and clear and interesting way of presenting his subject have won him popularity as a public speaker. He was born at Elmwood, Ill., and was graduated at the University of Illinois in 1879. After completing an art course in Paris, at the School of Fine Arts, he established a studio in Chicago, which has since been his headquarters. In 1886 he became an instructor at the Chicago Art Institute, and in that capacity has exercised a helpful influence over thousands of young people. In 1909 Taft was made professorial lecturer at the University of Chicago.

His work represents a blending of the ideal and realistic tendencies in sculpture. One of his best-appreciated sculptures is a symbolic group called *The Spirit of the Great Lakes,* which has been set up on the south façade of the Art Institute (see illustration, page 1311). He also designed a remarkable colossal *Fountain of Time* for Chicago's Midway Plaisance, a boulevard connecting Jackson and Washington parks. Other works include the *Columbus Memorial Fountain,* at Washington, D. C.; the *Washington Monument,* Seattle; *The Blind,* suggested by Maeterlinck's drama of that name, and *Solitude of the Soul.* He has written a *History of American Sculpture,* the best work on the subject yet written.

SCULPTURE BY TAFT
"Solitude of the Soul," in the Art Institute, Chicago.



TAFT, WILLIAM HOWARD (1857-), an American statesman, the twenty-seventh President of the United States. It was the tragedy of President Taft's administration that it transformed him from one of the most popular of Americans to one who came to be disliked by a large section of the people. By temperament and training Taft was a judge. The very traits which are most admirable in a judge—studious habits, deliberate decisions—were most exasperating in a President at a time when quick decisions and a keen grasp of new things were needed. As President, moreover, Taft lacked the personal picturesqueness of his predecessor, Roosevelt, with whom he was constantly compared, and with whom he finally quarreled.

In the course of years the mistakes made by the Taft administration will seem less significant, and historians will be inclined to give more heed to its high aims and just motives, and to its real and great achievements. In the heat of political conflict, charges of bad faith and evil motives were so frequent that the essential fairness of the President's position was often lost to view. As with Grover Cleveland, so with William Howard Taft; the unpopularity of the moment may be turned into lasting respect—in fact, is already so turning. In private life President Taft's virtues were honored without stint, and he won the liking of men with whom he came into intimate relations; his bitterest political opponents could yet remain among his good friends.

William Howard Taft was born on September 15, 1857, at Cincinnati, Ohio. He was the son of Alphonso Taft and his second wife, Louisa Torrey, both of whose ancestors joined the Massachusetts Bay colony in the first half of the seventeenth century. Alphonso Taft was an able lawyer and a distinguished public servant. He first came into national prominence as a judge of the Cincinnati superior court, when he upheld the right of the local board of education to abolish the reading of the Bible in the common schools. Although this decision cost him the governorship of Ohio, it gave him a national reputation, which President Grant recognized when he made him Secretary of War (March, 1876) and then Attorney-General (May, 1876).

In 1874, after his graduation from the Woodward High School of his native city, young Taft entered Yale University. There he frankly set out to win honors for scholarship. It is noteworthy, however, that his attention to his studies did not keep him from becoming one of the most popular men in his class, and in his senior year he was elected to one of the exclusive, secret "senior societies," or clubs. At graduation he ranked second in a class of 121 men. Returning home, he studied at the Cincinnati Law School, and when he was graduated in 1880 he shared first honors with one other. It is interesting to note that Robert, President Taft's eldest son, graduated in 1913 from the Harvard Law School with the highest honors which that institution had ever awarded.

Instead of entering immediately on the practice of his profession, the future President became law reporter for the Cincinnati *Times*, which was owned by his half brother, Charles Phelps Taft (born 1843). As the son of Judge Alphonso Taft and as the younger brother of one of the leading Cincinnati newspaper owners, he was almost from the day of his admission to the bar under the watchful eye of the local Republican party managers, but it was his demonstrated ability that brought him such rapid advancement that at thirty he ascended the bench as judge of the Ohio superior court. In the meantime he had been assistant prosecutor of Hamilton County, collector of internal revenue and assistant solicitor of Hamilton County. He was serving in the last office when Governor Foraker in 1887 appointed him to fill a vacancy on the superior court. When Taft's

term expired he was reëlected, but he resigned in 1890 when President Harrison appointed him Solicitor-General of the United States.

Thus at the early age of thirty-three Taft was second in command of the Federal Department of Justice. In this position he was given charge of the "Sayward case" before the United States Supreme Court. This was a test case brought by the Canadian government to determine the authority claimed by the United States over the seal fisheries in Bering Sea (see BERING SEA CONTROVERSY). Taft's brief was clear on every point and convinced the court. Shortly afterward he was called on to defend the McKinley Tariff Act, whose constitutionality was attacked because it had been passed by a quorum counted by the Speaker of the House of Representatives but not voting on the roll call. The Solicitor-General convinced the court of the constitutionality of the law by pointing out the clause of the Constitution which provides that a minority in either House may "compel the attendance of absent members in such manner and under such penalties" as it may provide; this clause would be worthless if the returned members could prevent a quorum by refusing to answer to their names. In both these cases Taft's arguments won national attention.

On the Federal Bench. In 1892 President Harrison appointed Taft to the bench as judge of the sixth circuit on the newly established Court of Appeals. During the eight years in which he sat on the bench, Judge Taft became a national figure, particularly for his decisions regarding railroads and organized labor. These decisions were noteworthy for the open-mindedness with which he dealt justice both to capital and to labor. Perhaps the most important case which Judge Taft decided was one involving the Addyston Pipe & Steel Co. This case was a suit by the Federal government to break up a monopoly in cast-iron pipe. In his opinion Judge Taft reviewed the history of this typical trust, and showed that it was in fact a combination which aimed at and had succeeded in placing restraints on the trade in cast-iron pipe. The decision was all the more important because the case involved the three principal illegal features—restraint of trade in interstate commerce, conspiracy and fraud—and also because it had been preceded by a number of cases in which the government had been defeated. Taft's opinion was so complete that the United States Supreme Court, when it refused to set aside the judgment, incorporated it bodily in the decree of affirmation. In 1894 Judge Taft granted an injunction against one F. W. Phelan, because the latter, as the agent of Eugene Debs, was endeavoring to tie up railroad traffic, and about the same time he delivered a decision declaring the secondary boycott illegal.

Governor of the Philippine Islands. In 1900, at the close of the Filipino insurrection, President McKinley appointed a civil commission, partly to investigate conditions and partly to govern the islands. Of this commission Judge

WILLIAM HOWARD TAFT
His ambition was to become a useful member of the Supreme Court, but he became President of the United States, almost against his will.

Taft, against his desires, was made chairman. With the four other members he made a tour of the islands to learn their needs at first hand. As a result of this investigation civil government was restored on July 4, 1901, and Judge Taft became the first civil governor. During the four years for which he held this office he not only carried out the work he was sent to do, but made himself popular both among the natives and the American residents, and won a high reputation as a colonial administrator. After order was restored, Governor Taft introduced, one by one, minor civil courts in various parts of the island, a new system of land records, records of vital and social statistics, sanitary regulations, common schools, with Americans as teachers, and many other improvements. One of the greatest achievements of his administration was the successful negotiation with Pope Leo XIII for the purchase of the friars' lands, vast tracts owned by the four Roman Catholic missionary Orders established

in the islands. In order to complete these negotiations, Governor Taft made a successful trip to Rome.

In the Cabinet. In 1903, in the midst of his work in the Philippines, Governor Taft was offered a place on the Supreme Court of the United States, a place he much desired. His reply to President Roosevelt reveals the heavy responsibility which rested on him, and by inference, shows the vast influence he had won in the islands among the natives. It was as follows:

> Great honor deeply appreciated, but must decline. Situation here most critical from economical standpoint. Change proposed would create much disappointment and lack of confidence among people.

A year later, however, he accepted the Secretaryship of War in President Roosevelt's Cabinet. Great progress had been made in the islands in the year, so that the change was less hazardous. As the islands, too, were under the direction of the Secretary of War, Taft's experience proved most valuable. Far from restricting his activities to office work, his new position widened his range. He was soon recognized as the spokesman of the administration, and represented it on many occasions. In 1906 he served temporarily as Governor of Cuba, after the intervention of the United States in the affairs of that infant republic. A year later he visited the Panama Canal Zone, and established American government there. In the same year he made a trip around the world, primarily for the purpose of attending the opening session of the Philippine Legislative Assembly. He also visited Japan and China, and diplomatically disposed of several problems which had caused complications in the relations of the United States with those countries.

Candidate for President. It was about this time that President Roosevelt let it become known that he favored the nomination of Taft in 1908 as the Republican candidate for President, and in the months immediately preceding the national convention the President's influence was ardently thrown in favor of his Secretary of War. In a public statement Taft had previously said:

> * * * my ambition is not political; I am not seeking the Presidential nomination; I do not expect to be the Republican candidate.

Taft's own popularity, added to President Roosevelt's influence, easily gave him the nomination, by a vote of 702 out of 980 delegates on the first ballot. His running mate was James S. Sherman of New York, a well-known member of the House of Representatives. The Democratic candidate was William J. Bryan, already twice defeated. The campaign was not very exciting, and Taft and Sherman were elected (November, 1908) by 321 electoral votes to 162 votes for Bryan and John W. Kern. The popular vote was 7,679,006 for Taft to 6,409,106 for Bryan.

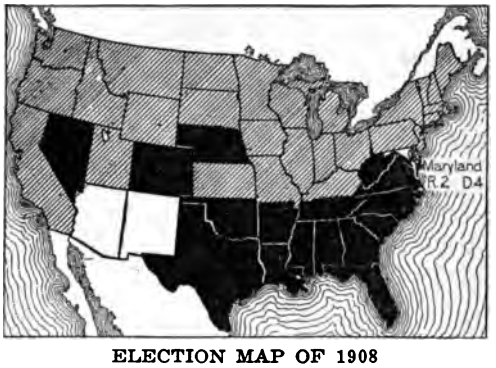
The Administration of William Howard Taft

The Payne-Aldrich Tariff Law. During the campaign and the months immediately following his election, President Taft was generally believed to be progressive. The fact that he had President Roosevelt's support was assumed as evidence that the Taft administration would proceed along the same lines of policy as had its predecessor. But such did not prove to be the case. After his inauguration President Taft at once called Congress in special session to revise the tariff. The popular sentiment was unquestionably in favor of "revision downward," but the Payne-Aldrich law as finally passed made few important reductions and a considerable number of increases in duties. Even the President admitted that the law was too strongly protectionist, and that it did not comply with the spirit of the Republican platform upon which he had been elected. He approved it, nevertheless.

Important Legislation. In view of its amazing political results, the Payne-Aldrich Tariff is perhaps the outstanding legislative feature of the administration. The administration should be judged, on the contrary, at least partly on the constructive measures passed. These included the establishment of the postal savings bank system (1910) and the parcel post (1912), the organization of a Commerce Court and the enlargement of the powers of the Interstate Commerce Commission (1910); acts requiring publicity for campaign contributions for Federal elections; and acts providing civil government for Alaska and creating the Department of Labor. In 1912 Congress passed an act exempting American-owned ships from the payment of tolls for passage through the Panama Canal. This law caused foreign complications, and the exemption clause was repealed in 1914. Another interesting bill, which was vetoed by

President Taft in 1912, provided a literacy test for immigrants.

Foreign Relations. For its achievements in diplomacy the Taft administration ranks among the highest in the history of the United States. It was constantly facing difficult problems, and these were settled to the benefit of the United States. In 1909 the second American occupation of Cuba came to an end, and in the same year a long-standing dispute with Venezuela was submitted to the Hague Tribunal. Secretary Knox in 1910 proposed to the various nations that the Hague Tribunal be made a permanent court of arbitration. At the same time he was negotiating arbitration treaties with France and Great Britain; these treaties were ratified by the Senate on March 7, 1912, but in such amended form that the President refused to submit them to the governments concerned. The year 1910 also witnessed the end of the fisheries dispute with Great Britain and the beginning of a dispute with Russia. The latter



ELECTION MAP OF 1908

The states shown in black gave their electoral votes to Bryan, Democrat; in the shaded area, to Taft, Republican. The white areas were at the time nonvoting territories.

country, by refusing to honor passports issued by the United States to naturalized Russian Jews, drove the President to abrogate the commercial treaty of 1832. Congress by resolution approved this course.

Reciprocity with Canada. One of the things on which President Taft had set his heart was the negotiation of a reciprocity treaty with Canada. An arrangement, popularly called the Taft-Fielding treaty, was made, reducing the tariff duties on a list of commodities exchanged between the two countries. A bill incorporating these changes passed Congress in 1911, but in Canada reciprocity was defeated (see page 1128).

"Dollar Diplomacy." Until the nineteenth century it was customary for a nation to use diplomacy to advance its commercial interests. "Dollar diplomacy," as expounded and practiced by Secretary of State Philander C. Knox, was a reversal of this practice—it meant the use of trade and commerce to advance a nation's diplomatic prestige. A good example of this policy was the "six-power loan" to China. That country desired to enlist foreign capital. Secretary Knox did not wait for American bankers to ask for backing, but at once, in 1912, urged them to join with the European lenders and thus secure for the United States a share in the influences working on the Chinese government.

Another example of "dollar diplomacy" was the treatment of Nicaragua and Honduras. In order to encourage American investment in the loans of these nations, the United States government obtained the right to collect taxes. The amounts collected could then be applied on the interest of the loans. "Dollar diplomacy," in few words, meant that the flag follows trade instead of that trade follows the flag.

Mexican Affairs. Beginning in 1910 and continuing to the end of his term, President Taft's most serious foreign problems arose out of the disturbed conditions in Mexico. The revolution of 1910, led by Madero, resulted in the fall of Diaz, and the revolt of 1913, led by Huerta, caused the overthrow of the Madero government and the death of its chief. The President was averse to intervention, but in an emergency, in the spring of 1911, he ordered 15,000 troops to protect the Mexican border. At the same time he notified the Mexican government that intervention was not intended. With the Madero government the United States was on friendly terms, but President Taft, a month before the end of his term, refused to recognize the government of General Huerta, and thus left a difficult problem for his successor, Wilson.

Economic, Social and Political Unrest. Not only in foreign affairs did President Taft's administration face serious complications. These four years, 1909-1913, are remarkable for social and political changes, some of which came suddenly, and some after years of discussion. Upheaval was apparent in many forms, in concrete changes as well as in talk and thought. A general discontent with many political and economic conditions was evident throughout the country. The spread of prohibition and woman suffrage, the introduction of the direct primaries and the popular election of United States Senators, the extension of the initiative,

1909 TAFT'S ADMINISTRATION 1913

Roosevelt Dam Completed

SIXTEENTH AMENDMENT ADOPTED PROVIDING FOR INCOME TAX

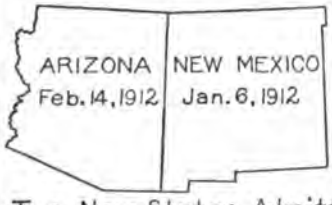
SEVENTEENTH AMENDMENT PROPOSED FOR DIRECT ELECTION OF SENATORS

PAYNE-ALDRICH TARIFF LAW

PROTECTIVE TARIFF

1909

Emblem of National Progressive Party. Organized 1912



Two New States Admitted

Parcel Post Organized 1913

Five More States Adopt Woman Suffrage

Glacier National Park Established 1910

referendum and recall, the commission form of municipal government, the city manager, the frequent investigations into the affairs of trusts, the conservation movement, and, finally, the breach in the Republican party—these were all signs of the times.

Woman suffrage made tremendous strides between 1909 and 1913. Washington in 1910, California in 1911, Arizona, Kansas and Oregon in 1912 were added to the list of states which have granted full suffrage to women. These brought the total to twelve states at the end of the Taft administration. Another striking movement was the rapid spread of prohibition. As a matter of fact only one state, West Virginia (in 1912), adopted prohibition while Taft was President, but the movement was gathering force which was revealed by the addition of five states to the "dry" column in 1914 and 1915, and by many additions to the local option "dry" areas. One of the most significant political changes since the War of Secession was the adoption of the Seventeenth Amendment to the Constitution. It provided for the popular election of United States Senators. It was proposed in 1913, but did not become effective until after the expiration of Taft's term. Another great change was the Sixteenth Amendment, which was adopted in 1913, and authorized the levy of a direct Federal income tax. In a few years this was to become one of the chief sources of the national revenue.

While the existing unrest thus expressed itself in certain concrete achievements, it was also revealed in a general tendency to investigate. Thus the President, by virtue of a clause in the Payne-Aldrich Act, appointed a tariff board of five members to study the making of future tariffs. The board had no legal standing, and much of its labor was wasted. Another great investigation was that conducted by the National Monetary Commission, headed by Senator Nelson W. Aldrich; out of its report grew the Federal Reserve Bank system (see BANKS AND BANKING).

The Anti-Trust Tendencies. But what will probably be longest remembered as the distinguishing feature of the Taft administration was its attitude towards the great trusts. The Attorney-General, George W. Wickersham, organized a bureau for the purpose of studying suspicious-appearing corporations and obtaining evidence. Suits at law and in equity were brought against about seventy trusts, including those which controlled the manufacture or distribution of sugar, beef, lumber, paper, window glass, bathtubs, wire, steel, harvesters, shoe machinery and shipping. In 1911 the Supreme Court ordered the dissolution of the Standard Oil Company and the so-called "tobacco trust." All trusts were pursued with impartiality, with the result that more combinations were called in civil or criminal suits than had been attacked by all of Taft's predecessors since the passage of the Sherman Act in 1890. At the same time the spirit of the public was indicated by Congressional "investigations," none of which had results of lasting importance. The most conspicuous was the investigation of the "money trust," or the banking and financial interests. The facts disclosed were of value in framing the Federal Reserve Act and the Clayton Anti-Trust Act in the succeeding administration.

Ballinger-Pinchot Controversy. Almost at the outset of his term President Taft identified himself, perhaps unwillingly, with the extreme conservative Republicans as against the progressive element. In the Ballinger-Pinchot dispute he sided with his Secretary of the Interior, Richard A. Ballinger, and dismissed Gifford Pinchot from office. Pinchot had charged that the Interior Department had encouraged illegal entries for Alaskan coal lands and in other ways had abandoned the policy of conservation of natural resources as begun in the Roosevelt administration. Technically Pinchot was guilty of insubordination, for which he was dismissed, but the fact that the evidence against Ballinger was strong might have justified the President in taking some other course. He, however, stood by the Secretary, who was ultimately exonerated by a Congressional committee.

The Breach in the Republican Party. During the Roosevelt administration there had arisen a fairly sharp distinction between the conservative and the progressive elements in the Republican party. The latter generally had the support of the President, and when Taft took office on Roosevelt's recommendation, it was assumed that he would continue Roosevelt's policies. By his defense of the Payne-Aldrich Tariff Act, however, President Taft immediately alienated the progressive Republicans. The two factions were further divided by the more or less openly avowed sympathy of Roosevelt with the insurgents, on his return from Africa. The breach between the two factions led to a Democratic victory in the Congressional elections of 1910, and gave the Democrats control of the House of Representatives. The Democrats, aided from time to time by the insurgent Republicans, carried tariff

OUTLINE AND QUESTIONS ON WILLIAM HOWARD TAFT

Outline

I. Preparatory Years

(1) Birth and family
  (a) Father a distinguished jurist
(2) Education
  (a) College aims
  (b) Law study
(3) Early legal practice

II. Public Life

(1) State judiciary offices
(2) As United States solicitor-general
  (a) Important cases
(3) On Federal bench
  (a) Important cases involving capital and labor
(4) As governor of Philippines
  (a) Excellence as administrator
  (b) Introduction of reforms
(5) As Secretary of War
  (a) Spokesman of the administration
(6) Election to Presidency
  (a) Roosevelt's support
  (b) Quiet campaign

III. Administration

(1) Domestic affairs
  (a) Payne-Aldrich Tariff Law
    1. Dissatisfaction
    2. Political results
  (b) Establishment of postal savings bank
  (c) Parcel post established
  (d) Organization of Commerce Court
  (e) Prosecution under Anti-Trust Law
    1. Dissolution of Standard Oil Company
(2) Foreign relations
  (a) Occupation of Cuba ended
  (b) Venezuela dispute submitted to Hague tribunal
  (c) Fisheries dispute with Great Britain
  (d) Commercial treaty with Russia abrogated
  (e) Canadian reciprocity question
  (f) "Dollar diplomacy"
  (g) Mexican trouble
(3) Internal and local affairs
  (a) Spread of prohibition and woman suffrage
  (b) Ballinger-Pinchot controversy
  (c) Admission of two states
  (d) Hudson-Fulton celebration
  (e) Dedication of Roosevelt Dam
  (f) Glacier National Park opened
  (g) Breach in Republican Party
  (h) Election of 1912

IV. Later Years

(1) Professorship at Yale University
(2) Chairman of Red Cross committee
(3) The League to Enforce Peace
(4) Writings

Questions

What was meant by "dollar diplomacy," and in what way was it in effect a reversal of the previous practice?

Explain Taft's clever use of a clause from the Constitution to establish the constitutionality of a Federal act.

To what, primarily, was Taft's election to the Presidency due?

What "playground" did the nation have at the close of this administration which it did not have at the beginning?

What political party was founded during this administration? Give the circumstances of its birth.

Who was Gifford Pinchot and what part did he play in the history of this administration?

What other President was very popular at the beginning of his term and extremely unpopular at the end? What similarity is there in the later life of the two?

How did Taft's avowed purpose on entering college differ from that of his predecessor?

measures lowering the duties in several special schedules, and passed other laws of a "radical" nature, all of which were vetoed by the President.

The factional disputes among the Republicans continued until they became centered on the Presidential nomination for 1912. At first there were two leading candidates, Taft, as the candidate of the conservatives, and Senator La Follette, as the representative of the progressives. La Follette, however, was compelled by illness to cease active campaigning for a time. At this juncture, ex-President Roosevelt, at the invitation of the governors of seven states in which the "insurgents" were particularly strong, announced himself as a candidate for the nomination. At first dignified, the contest later became a warfare of personalities, with charges and countercharges hurled in every direction.

The Republican national convention, meeting in June at Chicago, was controlled by the Taft delegates. It was a scene of turmoil from the first day, the Roosevelt spokesmen contesting the admission of many of the Taft delegates. Most of the protests were ignored, and the Taft delegates were seated. The Roosevelt leaders resisted, and declared that the nomination rightfully belonged to their leader. Defeated on every point by the rulings of the national committee and the chairman of the convention, Elihu Root, the Roosevelt delegates refused to take part in the proceedings of the convention. On its last day they held a mass meeting and nominated Theodore Roosevelt by acclamation as the candidate of a new Progressive party. In August a formal convention ratified the nomination and completed the organization of the party (see PROGRESSIVE PARTY).

The campaign thus became three-cornered, for the Democrats in the meantime had nominated Governor Woodrow Wilson of New Jersey. The defection of the Progressives split the Republican party in two, and practically insured the election of Wilson. The chief features of the campaign were the attacks of the Republicans and Democrats against Roosevelt, and the latter's emphatic replies. In October, while the campaign was at its height, Roosevelt was shot by an irresponsible man in Milwaukee, and was compelled to stop active campaigning. The election gave Taft only eight electoral votes, those of Vermont and Utah, against eighty-eight for Roosevelt and 435 for Wilson. The popular vote was 6,286,214 for Wilson, 4,126,020 for Roosevelt, and 3,483,922 for Taft.

Other Events. Two states, Arizona and New Mexico, were admitted during this term, both in 1912. The admission of these was delayed for months because the President vetoed the joint resolution for their admission. He disapproved a provision in the Arizona constitution for the recall of judges, and it was not until that provision was eliminated that he signed the proclamation of admission. The completion and dedication of the Roosevelt Dam in Arizona was an event of national interest. In New York in 1909 was held the Hudson-Fulton Celebration to commemorate the three hundredth anniversary of the discovery of the Hudson River and the centennial of Fulton's *Clermont*, the first steamboat. Another great public playground, Glacier National Park (which see), was opened in 1910.

An Honored Ex-President. In the last months of President Taft's administration, public confidence in him seemed to be more or less restored. He took his defeat for reëlection with a calm which was characteristic of him. On his retirement from office he accepted the Kent professorship of law at Yale University, and in the same year was elected president of the American Bar Association. He continued to speak in public on questions of the day, and was on several occasions a severe critic of President Wilson's foreign policy. In 1916 he became chairman of the central committee of the American Red Cross. He was chosen president of the American branch of the League to Enforce Peace (which see), an organization whose object was to prevent, or at least reduce, the possibility of war by threatening to use the combined economic and military strength of the nations of the league against any nation which should make war without first trying negotiation and conciliation. In 1917 he did much to uphold the Wilson administration in its war preparations.

Though not as facile with his pen as Roosevelt, President Taft is a writer of distinction on political and economic subjects. He has written *Four Aspects of Civic Duty; The United States and Peace; Popular Government; Ethics in Service; The Presidency: Its Duties, Opportunities and Limitations*, and other volumes. W.F.Z.

Consult Dunn's *William Howard Taft, American;* Davis' *William Howard Taft, the Man of the Hour;* Wilson's *The Presidents of the United States;* and Mrs. William H. Taft's *Recollections of Full Years.*

TAGORE, *ta gohr'*, SIR RABINDRANATH (1860-), an Indian (Bengalese) poet, philosopher and religious teacher, winner of the Nobel Prize for literature in 1913. For twenty-five years before this award made his name familiar throughout Europe and America he had been the prophet of Bengal. One of his countrymen said of him that "he is the first among our saints who has not refused to live, but has spoken out of life itself, and that is why we give him our love." His poems, dramas, short stories, novels and essays are all filled with his religious faith. Patriotism is often their theme, but the undercurrent of a simple religious conviction is never concealed. His patriotism won for him the name of "the Soul of Bengal," and his poems and songs exerted much influence in developing a radical and national conciousness.

Whether in his writings for newspapers, his poems or his lectures, whenever he expresses his inmost thoughts, he speaks of essentials, of the things of the soul. He has a marvelous sympathy for the beauties of nature—a cloud, a mountain, a flower, a bird—but in them all he sees God. In all his work there is something of that typical Hindu reverence which led his parents to send him, as a boy of eleven, into the Himalaya Mountains that he might grasp the insignificance of the individual and the grandeur of solitude and space. His language is expressive, and yet unexpected. His poetry creates a picture which stimulates the imagination.

Tagore is primarily the interpreter of the East, and he rarely shows the influence of Western civilization. As a boy of seventeen he was at school in England, and he traveled in other European countries. He acquired an easy command of the English language, into which he has translated many of his own works. His translations are not all of equal merit, but all have the spirit of the original and many have an excellent technique. The most important of them are *Chitra; The Crescent Moon; The Gardener Gitanjali* (Song Offerings); *King of the Dark Chamber; The Post Office;* and *Sādhanā: the Realization of Life.*

In 1916 Tagore lectured in America on the subject of "Internationalism."

TAHITI, *ta he'te,* **ARCHIPELAGO.** See SOCIETY ISLANDS.

TAHOE, *ta'ho,* or *tah'ho,* a beautiful glacial lake on the boundary between California and Nevada, the largest body of water in the Sierra Nevada range. The mountains of two states, those on the Nevada shore, gray and rugged, and those on the California side, stately and verdant, are mirrored in its dark blue waters. The outlet of the lake is in the rushing Truckee River, which carries the overflow to a "sink" known as Pyramid Lake, where the water evaporates. The woods of the adjacent slopes are filled with game, and the lake and swift mountain torrents abound with fish, making the region a paradise of the sportsman as well as the delight of the tourist. Lake Tahoe is a popular summer resort, and in its vicinity are many attractive homes and fine hotels. The lake is oval shaped, and is about twenty miles long and half as wide. It has an elevation above sea level of 6,225 feet, and an average depth of 1,500 feet.

TAIL'OR BIRD, a song bird of India, Malaysia and the Philippines, so named from its habit of enclosing its nest within a large leaf, which it sews together at the edge with its slender bill. The nest itself is made of plant down, fine grass, hair, etc. The eggs are three or four in number, varying in color from reddish-white to bluish-green, boldly marked with brownish-red. This bird has back plumage of olive-green, white underparts and a chestnut crown. The nest is ingeniously sewed together with bits of silk or wool threads or with vegetable fiber, which the bird searches for most diligently.

TAILOR BIRD AND NEST

TAINE, *tayn,* HIPPOLYTE ADOLPHE (1828-1893), a French historian and critic, born at Vouziers. He was a student from his childhood, and by the time he was fourteen years old he had drawn up a schedule for his day's work to which he held rigidly—twenty minutes for play in the afternoon, an hour for music after dinner, and all the rest of his waking hours for study. The results of his intense application were seen when he entered the École Normale, where he speedily distinguished himself. In 1851 he was made professor of philosophy in the College of Toulon, but he soon

resigned the position to give his time to study and literary production.

In 1864 his celebrated *History of English Literature* appeared; this has been translated into many languages, and it ranks as one of the greatest works of its kind. In the same year he was appointed by the government, which had previously feared him because of his attitude toward Napoleon III, to a professorship in the École des Beaux Arts, where he distinguished himself by a series of excellent lectures on art. He continued to write critical studies on literature, art and history, producing in the last fifteen years of his life his great work, *Origins of Contemporary France,* in which he discussed the causes of existing conditions in France. In 1878 he was made a member of the French Academy. Taine was above all things logical, and all of his work is marked by the most accurate analysis.

TAJ MAHAL, *tahj ma hahl',* the costliest private tomb in the world, built by the Indian ruler Shah Jehan as a final resting place for the

THE TAJ MAHAL

Some buildings take on added beauty under the rays of a brilliant moon or in the light of the setting sun. Of the Taj Mahal it has been said that it "requires neither moonlight nor sunset; it brings its own atmosphere, its own light, 'that was never yet on land or sea.' "

remains of his favorite wife, Mumtaz-i-Mahal, "the pride of the Palace." The name *Taj Mahal* is the Persian for *crown of Mahal.* This mausoleum, which is accounted by some critics to be the most beautiful building ever constructed, is one mile east of Agra, and its erection covered a period of twenty-one years (1629-1650). It is built entirely of white alabaster, and is believed to have cost over $9,000,000.

It stands on a rectangular platform, from the four corners of which rise slender minarets, or prayer towers. The building itself is an octagon, 130 feet in length and width and seventy feet high. Above the central portion an exquisite dome rises to a height of 100 feet. The outside of the mausoleum is adorned with passages from the *Koran* and ornamental designs in inlays of costly gems, and within is a central chamber containing two cenotaphs, which the spectator views through an alabaster screen of beautiful openwork. Below this chamber is the vault wherein repose the remains of Shah Jehan and his wife.

No artificial lighting is needed for the interior, for the dome is semitransparent, and there are several windows with perforated alabaster screens. Through these the light glows with a marvelously softened effect. The structure is surrounded by a beautiful walled-in garden, the entrance to which is a superb gateway of red sandstone and white marble.

TALC, *talk* (short sound of *a*), a soft, magnesian mineral found in flat, smooth layers or plates in crystalline rocks. It is colorless, or of a greenish- or yellowish-white hue, shading to an olive-green, and is generally translucent. The thin plates are transparent and in China and India are used as a substitute for window glass. In its granular form it feels soft and soapy. Common talc is used in the manufacture of crayons and porcelain. *French chalk,* a fine, granular variety, is used for tracing lines on wood or cloth.

The United States produces more talc than all of the rest of the world, and in recent years the output has nearly doubled. It is found chiefly in the Blue Mountain region of the Atlantic states and in the hills of New England, and is generally mined in small fragments by underground methods. The state of New York produces over one-half of the total output, far outranking all other states except Vermont; in the latter state the industry has recently shown a marked development, and the annual production is now more than one-half that of New York. Smaller quantities are found in New Jersey, Pennsylvania, Georgia, Massachusetts, Virginia and North Carolina; the deposits of Southern California have attracted attention.

In 1914 the output in the United States of marketed talc was 151,088 tons; including soapstone, an impure, massive form of talc, it amounted to 172,296 tons. Canada produced in that year 10,808 tons, about one-half of which was exported to the United States. Talc of the higher grades, such as is used in the manufacture of toilet powders and gas tips, is imported chiefly from Italy and France. Smaller quantities are obtained from Austria-Hungary, England and Germany and a little from Japan.

TAL'ENT, a famous ancient coin and unit of weight. Because the best-known references to this ancient term are found in the Scriptures there frequently exists the impression that it was the Hebrews who chiefly made use of the talent, but such is not the case. The word occurs in the Greek of the New Testament, and it is in connection with Greek affairs that the measure is chiefly known. The Hebrews, however, did have such a weight, derived from Babylonia, which was equal to 3,000 shekels in silver, or between $1,800 and $1,920.

Like the Hebrews, the Greeks took the talent from the Babylonians, though the name is Greek. Both in measuring weights and in giving the denomination of money the talent was the largest Greek unit, but it was by no means uniform in different Greek states and at different times. The talent used for measuring gold, moreover, differed from that for measuring silver, and to understand references in Greek literature to talents it is necessary to know which of the various systems is intended. Perhaps the most commonly referred to, however, is the later Attic or Solonic, which was equivalent to fifty-six pounds fourteen ounces. A silver talent in Athens was worth between $1,000 and $1,100.

The Romans also made use of the talent, not as a coin but as a measure of money. They had a *great talent* and a *little talent*, the former worth about $480, the latter about $363.

The common present-day use of the word, meaning a special endowment or faculty, is derived from the parable of the talents in *Matthew* XXV.

TAL'ISMAN, THE, a prose romance by Sir Walter Scott, the scene of which is laid in Palestine during the Third Crusade. Richard Coeur de Lion, king of England, appears, as does his enemy, Saladin, who saves the English king's life by means of the "talisman"—a magic stone which is guaranteed to cure fevers. The hero is the prince royal of Scotland, who takes part in the Crusade disguised as Sir Kenneth, the Knight of the Leopard. *The Talisman* is one of the most popular of Scott's novels.

TALKING MACHINE, *tawk'ing ma sheen'*, a wonderful device for recording and reproducing sound, and particularly human speech. Within a very few years it has been advanced from the status of a plaything to a place of vast importance in the world; so quickly was it accepted by the people as an article to provide amusement that few yet realize that it is one of the most valuable of the world's inventions. It would merit a place in every home if its only mission were to furnish wholesome entertainment, but, like the moving picture, it is destined to be linked with history, with art, with music, for all time to come.

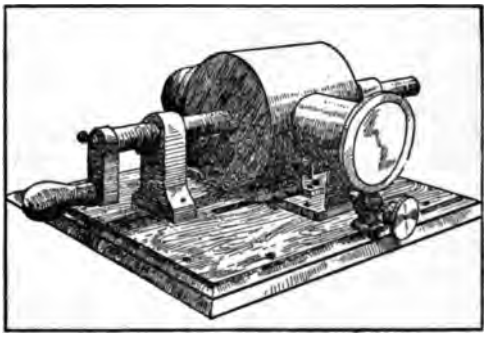
If every school child could to-day hear the voice of Abraham Lincoln delivering the imperishable 267 words of the Gettysburg Address, and on the moving-picture screen see him stand as on that occasion; could they hear the voice of Jenny Lind as their grandfathers heard it; could they hear the quieting words of Garfield, "God reigns, and the government at Washington still lives," uttered in New York the day after Lincoln's death; could they listen to the voice of Washington as he gave his country sage counsel in his Farewell Address; could British children hear to-day the ringing tones of Fox, Burke, Disraeli, Gladstone, which did much to shape the destinies of races—could there be chosen from a thousand "records" the spoken words which marked an epoch or decided great destinies, the past would possess a significance that the printed page never can give it. "You may fire when ready, Gridley," proclaimed preparedness, but we would experience a greater thrill of pride if we could hear the calm, unimpassioned, confident voice of Dewey on that May morning in Manila Bay.

Children a hundred years from now are to have rich experiences, because with the talking machine and the moving picture they are actually to hear things and see things which made history before they were born. They may hear the voice of Woodrow Wilson appealing to Congress for war in 1917; they will see in moving pictures the nation-wide response to that appeal. They will read in the books of that day of statesmen rising to oratorical heights in great crises, and will hear from the "records" those impassioned utterances. There will be great singers in that day, but probably few greater than Caruso, Melba, Homer and others of the present, and these will live then as now in the perfect talking-machine record.

Sarah Bernhardt rejoiced when she was asked to present a play for the moving pictures, for, she said, "Now I shall live a thousand years." Her voice will as long delight her countrymen and lovers of her supreme art everywhere, for she has spoken her "lines" into the "records."

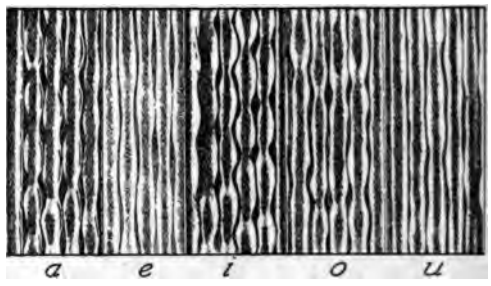
Furthermore, the talking machine is going to preserve spoken languages that are dying out, and also the present-day speech and folklore of American Indians. Students of foreign languages are aided in the mastery of pronunciation by "records" made for the purpose. The talking machine is rapidly entering the business world; the business man dictates his letters into the machine, and later the typist listens and writes. In the home it will be possible to preserve the voices of father, mother, brother and sister against the day when they will be absent forever.

Thomas A. Edison was the pioneer in the development of a practical talking machine, though the basic idea did not originate with him. In 1877 he brought out the first *phonograph,* which, as now perfected, operates on the following plan: Impressions of the sounds to be recorded are made on a wax-covered cylinder which revolves against a sharp needle point, or stylus, attached to a thin metallic diaphragm. The diaphragm, which is mounted on a carriage, is set in motion by the impulses of the voice or mechanism producing the sounds, and as it vibrates the stylus cuts into the wax small indentations or grooves, which travel in a spiral around the entire length of the cylinder. The reproduction of the sounds is accomplished through the medium of another diaphragm carrying a needle which follows the grooves already made in the wax. In the later type of talking machine the sounds were reënforced by means of a trumpet-shaped horn, and at a still later date the horn was abandoned.



THE FIRST TALKING MACHINE
The original Edison machine, invented in 1877.

The original Edison machine was provided with a cylinder covered with tin foil; the wax cylinder was the invention of Chichester A. Bell and Charles S. Tainter, who brought out the so-called *graphophone* in 1885. The graphophone, in brief, was the first phonograph in which a wax cylinder was used. In 1887 appeared the *gramophone,* the invention of Emile Berliner. This instrument made use of a disk instead of a cylinder, while the stylus cut on the disk a zigzag groove of the same depth throughout instead of one of varying depth. The *Victor Talking Machine,* the *Disk Graphophone* and the *Columbia Phonograph* are all patented forms of the original Berliner instrument. Though the first Edison machines were provided only with cylinder records, both cylinder and disk models are now manufactured by the Edison Company, and the old distinction between *phonograph* and *gramophone* has been lost. In fact, the tendency now is to designate a talking machine, whether of the cylinder or disk type, by its special trade name.



THE RECORD OF A TENOR VOICE
Part of a record, as seen through a powerful microscope. The differences in the curves show the differing indentations made in singing the vowel sounds. In reproducing these sounds the needle passes over these indentations and vibrates exactly as did the stylus which made the curves.

The improvements adopted by the various manufacturers of these instruments are numerous and ingenious. The more expensive machines are handsome pieces of furniture, made of expensive woods and sometimes adorned with elaborate carving or painted designs. The old-fashioned horn for reënforcing the sound is replaced by a chamber under the instrument, in which there is a sounding board resembling that of the piano. Electric motors are a modern improvement over the hand-turned crank, and there are other devices for regulating the volume and *tempo* of the sound. Indestructible diamond needles are used on many machines, and are considered an improvement over the steel or wooden needle that has to be changed frequently. The manufacture and duplication

of cylinder and disk records to supply the increasing demand for these articles has become a mammoth and profitable industry, and one that has called into service the highest technical skill. Popular singers whose voices are recorded are paid on the basis of royalties, and incomes from this source run into thousands of dollars a year.

Talking machines may be bought for $15.00 or less which are more perfect than the best instruments made about the year 1900. From this low price the cost of more elaborate machines varies from $50 to $500. G.B.D.

TALLADEGA, *tal a de'ga,* ALA., the county seat of Talladega County, situated in the north-central part of the state sixty miles east of Birmingham, the largest city in the state. It is served by the Southern, the Birmingham & Atlantic and the Louisville & Nashville railroads. Talladega is a trade center for white marble, and contains cotton and cottonseed-oil mills, a chemical plant and manufactories of hosiery and fertilizers.

Here are located state schools for the deaf, dumb and blind, Talladega College (Congregational) for colored students, a Presbyterian college for young ladies and an orphans' home under control of that denomination. The city also contains a Carnegie Library. Talladega is located on ground that was the scene of a battle fought in 1813 between Creek Indians and an American force under General Jackson. In 1911 the commission form of government was adopted. Population in 1910, 5,854.

TALLAHASSEE, *tal a has'e,* FLA., the state capital and the county seat of Leon County, centrally situated in the northern part of the state, 165 miles west of Jacksonville and 204 miles east of Pensacola. Railroad service is provided by the Georgia, Florida & Alabama and the Seaboard Air Line roads. In 1910 the population was 5,018.

Tallahassee is situated in a semimountainous country made attractive by abundant tropical vegetation and several beautiful lakes. The surrounding section is an agricultural district producing cotton, tobacco and sugar cane. The important industrial establishments of the place are manufactories of cottonseed oil, lumber, iron products, cigars and naval stores. The city is the seat of the Florida State College for Women and of a state normal school. Here also is located the Florida Agricultural & Mechanical College (colored), a part of the equipment of which is the Carnegie Library. The governor's mansion, supreme court library, state public library, Federal building and Elks' Club are the most notable buildings. Charles Louis Napoleon Achille Murat (the eldest son of the famous French cavalryman who was king of Naples from 1808 to 1815) came to America about 1821 and made his permanent home two miles west of Tallahassee. In 1826 he married the daughter of Col. Bird C. Willis of Virginia. Both he and his wife are buried in the Catholic cemetery at Tallahassee.

The Seminole Indians who originally occupied this territory were expelled, and a settlement was made here about 1818. It became the capital of the territory of Florida in 1824, and remained the state capital after the admission of Florida into the Union in 1845. Before the War of Secession, Tallahassee was a social center and residence city for wealthy Southern planters. F.R.S.P.

TALLEYRAND-PÉRIGORD, *tah leh rahN' pa re gohr'* (in English, *tal'i rand*), CHARLES MAURICE, Duke de, Prince of Benevento (1754-1838), a famous French statesman, born in Paris, and, next to Napoleon, the leading political character of his time. Though an eldest son, he was forced by lameness, which resulted from an accident in his childhood, to give up a military career, and was destined by his family for the Church. At Saint Sulpice, where he was trained, he showed neither inclination nor aptitude for religious life, but continued his studies, however, and in 1775 was ordained. In 1780 he was made agent-general of the clergy of France, and in that position showed the administrative ability which in 1789 secured his appointment as bishop of Autun. In that same year he was elected deputy to the States-General from Autun, and at once took rank as one of the foremost reformers.

Supported State above Church. He was one of the committee appointed to draw up a constitution and was a signer of the Declaration of Rights, and by his advocacy of the confiscation of Church lands won great popularity. Because he took the oath to the constitution and acknowledged the supremacy of the State he was excommunicated by the Pope in 1791, and in that same year resigned his bishopric. Meanwhile he had been a founder of the Friends of the Constitution, afterward the Jacobin Club, and had, in 1790, been elected president of the National Assembly; but like Mirabeau, with whom he usually identified himself, he was not violent enough to please the radicals, and gradually lost influence. Thus, while in England on a diplomatic mission in 1792, he was declared

to be one of the *émigrés* of royalist tendencies, and was forbidden to return to France. For two years he remained in England, then went to the United States, where he spent nearly three years.

Napoleon's Strong Aid. In 1796 he was allowed to return to France, and through the influence of Madame de Staël-Holstein secured the post of minister of foreign affairs. He saw that Napoleon was the coming man in the country, aided in the moves by which the Directory was overthrown and the consulate established, and as a reward was continued in his position as foreign minister. In this office he exerted himself to extend the power of Napoleon, who made him grand chamberlain in 1804 when the Empire was founded. Talleyrand was the chief spirit in the formation of the Confederation of the Rhine and in the negotiations with Prussia and Russia which, in 1807, culminated in the Peace of Tilsit. Soon after this he resigned his office, and during the later years of Napoleon's reign became the rallying center of the discontented spirits who hoped for a return of the old monarchy. He drew up the terms of Napoleon's abdication, and at the Congress of Vienna made use of his unusual diplomatic powers to obtain concessions for France.

After Louis XVIII was established on the throne Talleyrand took little part in public affairs, but when Louis Philippe became king by the Revolution of 1830 he was sent as ambassador to England and succeeded in forming the quadruple alliance of France, Great Britain, Spain and Portugal. This was his last important public act. Before his death he was reconciled to the Church.

Estimate of His Life. Talleyrand's name has come to stand for all that is underhanded in public affairs, and much censure has been heaped upon him because he enriched himself at the expense of the state. It is probable that in many instances he was misjudged, but in any case it is true that he piloted France several times through troubled waters when no one else could discern the wise course. A.MC C.

Consult Lacombe's *Talleyrand, the Man;* McCabe's *Talleyrand: A Biographical Study.*

Related Subjects. The following articles in these volumes will make clear certain references in this sketch of Talleyrand:

Directory	Napoleon I
Émigrés	Staël-Holstein, Baroness de
Jacobins	States-General
Mirabeau, Count de	

TALLOW, *tal'o,* a hard, white substance obtained in the process of rendering animal fat, especially that of sheep, goats and cattle. It is used extensively in the manufacture of soap, candles and lubricants, and for dressing skins and leathers; that which is of superior quality is employed in the making of oleomargarine.

Tallow is a mixture of the solid fats palmitin and stearin, and of the liquid fat olein. When pure it is whiter than lard and practically tasteless, but the commercial product usually has a yellowish tinge. It will not dissolve in water, but is soluble in boiling alcohol. The best grade is obtained from fat near the kidneys of cattle. In one process of tallow making the suet is cut into small pieces and heated over water until the fat has melted; it is then tried out. The tissues that are left are pressed to obtain the tallow that may remain. Acid rendering consists in boiling the fat with water and sulphuric acid, which causes the tissues to dissolve. Tallow is also produced by melting the suet in iron cylinders heated by steam under pressure. A substance similar to animal tallow is obtained from certain trees. See TALLOW TREE.

TALLOW TREE, the name of various trees which produce a waxlike substance that may be used like tallow for making candles. The tallow tree of China, which is the most widely distributed, has been introduced into North America and is becoming naturalized along the coasts of Georgia and the Carolinas. At the approach of winter the long, leathery leaves become a deep red, and among them hang the seeds, suspended by waxlike threads. The tallow, or wax, is obtained by crushing and boiling both capsules and seed, and skimming off the tallow as it rises. This substance is afterwards melted and refined, and ordinary wax is added to give a firmer consistency. It is used chiefly for candles, but a scented soap of good quality is also made from it, as it emits a balsamic odor. The leaves furnish a black dye, and the stem yields a resinous substance called *copal,* used in making varnish. The *bayberry,* or *candleberry* (which see), a small tree or shrub, also furnishes wax used in making candles. These burn slowly, but do not give a strong light.

TALMAGE, *tal'mayj,* THOMAS DE WITT (1832-1902), one of America's greatest clergymen and orators, was born at Bound Brook, N. J., educated in New York University and the Dutch Reformed Theological Seminary at New Brunswick, N. J., and in 1856 was ordained pastor of the Dutch Reformed Church, Belleville, N. J. He began immediately to attract

notice through his remarkable oratory and fearless statements, and soon received offers of other pulpits. In 1859 he accepted the pastorate of the Dutch Reformed Church at Syracuse, N. Y., and three years later went to the church of the same denomination at Philadelphia. While holding this position he was permitted by his congregation to become a chaplain in the Union army, and was most energetic in caring for the physical and spiritual welfare of soldiers in Pennsylvania, Maryland and Northern Virginia.

In 1869 he accepted the position of pastor of Central Presbyterian Church, Brooklyn, N. Y., and within one year the congregation had become so large that an immense structure known as the Brooklyn Tabernacle was erected. There his eloquence and bold denunciation of existing evils attracted such audiences that even the new building was often uncomfortably crowded. He was in great demand as a lyceum lecturer and was so frequently absent from his pulpit that Josh Billings once mentioned in his *Allminax* as one of the remarkable events of the year that "Talmage spoke in Brooklyn Tabernacle." His influence as a public leader was increased not only by this lyceum work but by the weekly publication of his sermons in more than 3,600 city and country newspapers.

Between 1872 and 1894 the Tabernacle was burned three times, and after the third fire Dr. Talmage resigned. The following year he accepted the pastorate of the First Presbyterian Church at Washington, D. C., but resigned in 1899 to devote his time to writing. He was author of such popular religious books as *Every Day Religion, The Almond Tree in Blossom* and *From Manger to Throne.*

TAL'MUD, the book of Jewish civil and religious law, aside from the Pentateuch. It had its beginnings in the time of Ezra, the period following the Exile, when new conditions of national life called for new laws. Decisions were made from time to time by those in authority, which, as centuries passed, grew into the mass of tradition known as the *Oral Law.* In the times of Jesus the scribes and Pharisees required strict observance of all the details of this law, but the Sadducees opposed it, declaring their only authority to be the Pentateuch. After the rise of Christianity and the destruction of Jerusalem by the Romans, pious Jews turned their zeal toward putting the Oral Law into writing. This work was completed at the close of the second century and formed the part of the Talmud known as the *Mishna,* meaning *instruction.* After this, scholars commented on the *Mishna,* preserving their work in the second part of the Talmud, known as the *Gemara.* There are, in reality, two *Gemaras* extant, the Palestinian and the Babylonian, the latter being the larger and more trustworthy. It was completed in the sixth century. The *Mishna* was written in Hebrew; the commentaries, in Aramaic.

These Jewish works, though opposed to Christianity, did much to stimulate Christian thought of the Middle Ages and must be given a part of the credit for the German scholarship that made possible the Protestant Reformation. Students to-day find in them much interesting matter concerning Jewish manners and customs in Bible times. See HEBREW LANGUAGE AND LITERATURE.

Consult Rodkinson's *History of the Talmud.* Darmesteter's *The Talmud* is an English translation.

TALON, *ta lohN',* JEAN BAPTISTE (1625-1691), a French official in Canada, one of the ablest of the men who created New France. After serving in the civil service of France for some years, he was in 1665 appointed "intendant of justice and finance" for the French possessions in North America. Talon was able and energetic. He built a ship at the king's expense, in order to show the people how to build ships. He sent out engineers to search for coal, copper, lead and other minerals, and he himself made shoes and woolen cloth as an example to the colonists. He also gave much aid and encouragement to the Jesuits in the explorations and missionary enterprises on the shores of the Great Lakes. One of his orders provided that bachelors should not hunt, fish or trade with the Indians, the obvious purpose of this order being to encourage permanent settlement by families. A book by Talon, *Mémoire à Sa Majesté sur l'état Présent du Canada,* published in 1667, is a valuable record for the history of New France.

TA'LUS. At the foot of every cliff or large ledge there is a heap of loose rocks that have been broken from the large mass or face of the cliff. The name *talus* has been given by geologists to such heaps. The fragments forming the talus are broken off by weathering and by the action of water, which in cold climates is the most powerful agent. Water enters the crevices in the rock, where it freezes; in freezing, it expands and makes the crevice larger. This process is repeated each winter until, finally, a large fragment is broken from its bed and falls to the foot of the cliff.

A new talus contains large fragments of rock and has a steep slope, but an old talus is usually composed of fine particles, and has a gentle slope. In such a talus we can easily trace the transformation of rock into soil. See EROSION.

TAMAQUA, *ta maw' kwah,* PA., a borough in Schuylkill County, situated in the eastern part of the state about midway between its northern and southern borders, and on the Little Schuylkill River, ninety-eight miles northwest of Philadelphia. The Central of New Jersey and the Philadelphia & Reading railroads provide railway transportation, and electric lines communicate with adjacent cities and towns east, west and south. This locality is noted for its immense deposits of high grade anthracite coal, and the leading industry of the city is the mining and shipping of this product. The manufactories include powder mills, hosiery factories, foundries and lumber mills. Tamaqua has a library and a state hospital. The place was settled in 1799, was organized in 1829, and was incorporated as a borough in 1833. The population increased from 9,462 in 1910 to 10,840 in 1916 (Federal estimate). *Tamaqua* is an Indian name which means *running water.*

TAMARACK, *tam' a rak,* the name applied in the Western and Southern United States to the *larch.* In New England and Canada it is known by the local name *hackmatack.* The tree is described under the title LARCH.

TAMARIND, *tam' a rind,* a large, tropical tree of the pulse family of plants, cultivated for ornament and utility. Its fruit, a brown pod from three to six inches long, is filled with an acid, juicy pulp which is used in India to make cooling beverages, such as sherbet. This pulp is shipped in large quantities to European countries, being packed in layers in casks. Boiled in sugar or syrup, it becomes the preserved tamarind of commerce. Tamarind seeds are used to make a yellow or red dye, and the root of the tree furnishes a beautiful hard wood, valued for cabinet work, though fashioned with difficulty. The tree itself is very attractive, with wide-spreading branches and light green foliage. It is widely distributed in warm countries, but has not been successfully cultivated anywhere in the United States except in Florida.

TAMBOURINE, *tam buh reen',* a musical instrument constructed on the principle of a drum, consisting of a circular wooden or metal frame about two inches deep, across the top of which is stretched a piece of tightly-drawn parchment. Little bells are attached to the hoop, and these jingle when the parchment is struck. The tambourine has no musical pitch, but is used merely to beat rhythm. The performer plays it by striking it with the knuckles or elbow. Spanish and Italian peasants and gypsies of all sorts use it for their dances, and it is invariably found in Salvation Army bands. This instrument is similar to the *timbrel* of the Old Testament.

TAMERLANE, a form of the name of the conqueror Timur (which see).

TAMMANY, *tam' a ni,* **SOCIETY,** or THE COLUMBIAN ORDER, was founded in New York City, May 12, 1789, by William Mooney, two weeks after the government of the United States was established. Mooney had been a soldier of the Revolutionary War, and he started the organization as "a fraternity of patriots solemnly consecrated to the independence, the popular liberty, and the federal union of the country." The original members were those who, before the war, had been members of the "Sons of Liberty" and "Sons of Saint Tammany," societies which were organized to promote the cause of independence.

The organization of the society was by tribes, one for each of the thirteen states. The nomenclature was selected from Indian words and phrases, the name of Tammany being adapted from that of an Indian chief whom tradition credited with great wisdom and with respect for white people. The members were called *braves,* the place of meeting was the *wigwam,* the thirteen states were named *Eagle, Panther, Deer,* etc. The head officer of each tribe was a *sachem,* and the head of the national organization was the *grand sachem.* The honorary title of *very grand sachem* was conferred upon Washington and his successors for a time, but was abolished at the close of Jackson's administration. The master of ceremonies was called *sagamore,* and "Freedom our Rock" was adopted as the society's motto. The Tammany Society always fought for manhood suffrage and against imprisonment for debt.

In the first years of the country's history, the government tried, but failed repeatedly, to conclude a treaty of peace with the warlike Creek Indians. The Tammany Society undertook the task of conciliation, and brought the chief and twenty-eight of his warriors to New York City for a banquet, in August, 1790. Then the members of Tammany, themselves dressed in full Indian costume, escorted the Creeks to a conference with President Washington. The result was the signing of a treaty the next day.

The New York Historical Society, the Academy of Design and many other educational institutions were founded or fostered by Tammany. On April 13, 1808, the Society marched in a body to Wallabout Bay, and laid the foundation stones for a mausoleum, where they later deposited the bones of 11,600 Revolutionary patriots. In the War of Secession the grand sachem of Tammany, William D. Kennedy, led a regiment composed of members who were equipped by the organization. It would be difficult to record even a small part of the interesting and worthy exploits of this society during its early history.

The Society in Politics. Although the organization existed for many years for patriotic purposes, it soon came to have a political significance. For many years it led practically a twofold existence—patriotic and political—with the leadership of both elements in the same hands. Tammany Hall, the home of the Society, was eventually leased to the political element in its membership, with the privilege also of using the Society's name. For a time there was a nominal connection between the two wings, but for nearly fifty years Tammany has been recognized solely as a political machine, wielding vast power, perfect in its organization, and determined to control the government of the city and state of New York.

Numerous scandals have darkened its history, the most notable one occurring in 1871, when Tammany Hall was under the leadership of William M. Tweed. Far-reaching bribery and corruption were charged against the organization and Tweed was eventually sent to prison. About twenty-five years later, under the leadership of Richard Croker, the power of Tammany spread until its influence was felt in national affairs. However, its effort to dominate national politics has never been successful. Such notoriety surrounded the last years of Croker's reign that he preferred a residence in Great Britain rather than continue in the turmoil of New York politics.

His successor in the leadership was Charles F. Murphy, under whom Tammany has been both the victor and the vanquished in election contests; but fully half of the time since the days of Croker, Tammany has had control of the administration of affairs in the city of New York and has at times dominated the legislature at Albany. In 1913 it met with the most serious defeat of a decade when its candidates for office in New York City were so badly defeated by the ticket headed by John Purroy Mitchel (born 1879) for mayor that Murphy's control of the organization was threatened.

The present Tammany Hall exists because of its influence over the hordes of people on the East Side of New York City and across the river in Brooklyn, a part of Greater New York. Tammany holds the fealty of this great mass of voters by reason of its almost paternal care of what they believe to be their material interests. C.H.H.

Consult Kilroe's *Saint Tammany and the Origin of Society of Tammany, or Columbian Order of New York.*

TAM'PA, FLA., a winter resort on the western coast of the state, and the county seat of Hillsboro County. It is situated on an inlet of Tampa Bay at the point where it receives the Hillsboro River. Jacksonville is 212 miles northeast. Transportation is provided by the Atlantic Coast Line, the Seaboard Air Line, the Tampa Northern and the Tampa & Gulf Coast railways, by steamer lines which operate to Key West, the West Indies and important Gulf and Atlantic ports, and by lines operating between Tampa and Port Tampa. The population increased from 37,782 in 1910 to 53,886 in 1916 (Federal estimate). Tampa ranks second among the cities of the state, Jacksonville holding first place.

Tampa has the best harbor on the western coast of Florida. By water and by rail, the city sends out large shipments of fruits, vegetables, lumber, rosin, fish, cattle, wheat, flour, turpentine and phosphate. The most important industry is the manufacture of cigars. Although Florida raises a superior grade of tobacco, most of the supply used in the cigar factories of the city comes from Havana. About 10,000 people, mostly Cubans, are employed in the cigar factories, and about 300,000,000 Havana cigars, the greater part of the world's supply, are made here annually. The fishing industry and the manufacture of fertilizer are also important.

Owing to its delightful location and its healthful climate, Tampa has become a favorite winter resort, and its fine hotels are among its most notable buildings. The magnificent Tampa Bay Hotel, which was erected at a cost of $5,000,000, is owned by the city and operated under lease. It is one of the largest tourist hotels in the United States. Tampa has a handsome Federal building, a customhouse and a number of fine church, school, bank and office buildings. In addition to the public schools there are the Jesuit College, the Holy Name Academy, for girls, and a Carnegie Library.

The settlement of Tampa began with the establishment of an army post called Fort Brooke, about 1850. During the War of Secession it was taken by the Federals, when it was only a small shipbuilding center. Here, in De Soto Park, the United States Volunteers encamped during the Spanish-American War. In 1886 railroads were constructed to the city, the tobacco industry was established, Tampa became a port of entry, and the city charter was granted. From that time its growth was rapid. L.P.D.

TAMPICO, *tahm pe' ko,* the most important center of oil production and one of the leading seaports of Mexico, situated six miles from the Gulf of Mexico near the mouth of the Pánuco River, and 206 miles northeast of Mexico City (see map, opposite page 3768). It is located in the state of Tamaulipas, and occupies the site of an ancient Aztec city. Though Tampico suffers from a hot, humid, unhealthful climate, the place has experienced a remarkable growth because of the development of the rich oil fields in the vicinity. During the War of the Nations the Tampico wells provided nearly all of the oil used by the British navy, and it was the necessity for closely guarding this valuable source of supply that induced President Wilson to lift the embargo on the export of ammunition into Mexico, in the summer of 1917. The business section of the city has broad, well-paved streets, fine public squares and substantial buildings, and good drainage and sewerage systems and gas and electric light plants have been installed. In 1914 Tampico came prominently into notice as the scene of the insult to the American flag that almost caused war between Mexico and the United States (see MEXICO, subtitle *Government and History*). Population, estimated, 35,000.

TANAGER, *tan' a jer,* a family of American birds noted for the brilliance of the male plumage. They are from six to eight inches long, and are usually found in the forests, where they feed on insects, fruit and flowers. The three hundred and fifty known species dwell chiefly in the tropical regions of Central and South America, and only four or five species reach the United States in their migrations northward. Of these the best known is the *scarlet tanager,* which nests as far north as New Brunswick. The male has bright scarlet plumage, with velvety black wings and tail, and the female is pale yellow below and olive-green above, with darker wings and tail. The nest is a frail, saucer-shaped structure placed near the end of a horizontal limb, and the eggs, three or four in number, are pale bluish-white or bluish-green, with reddish-brown markings. The scarlet tanager has a loud, cheery singing note something like that of the robin.

A familiar summer bird of the Southern states is the *summer tanager,* easily recognized by its

SCARLET TANAGER

rose-red plumage. It has much the same nesting habits and song as its scarlet-coated relative. Another interesting species is the *Western tanager,* found in summer from the Rockies to the Pacific coast. The male of this group is bright yellow, with black back, tail and wings and crimson head.

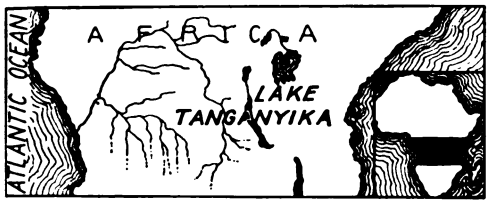
TANANARIVO, *tan nah na re' vo,* or **ANTANANARIVO,** the capital of Madagascar, the seat of the French authority over the island, is situated well inland, on a plateau at an elevation of over 4,000 feet. It is not an attractive city; the streets are very irregular, and the buildings are constructed almost entirely of wood. The only building of note is the former royal palace, the residence of the queen before her exile in 1896, when France took formal possession of the island, dropping the pretense of its former protectorate (which see). The inhabitants manufacture coarse textile fabrics and a few other simple necessities, but the inland position of the city, combined with poor facilities for transportation, restricts the commerce. However, two railroads to the coast from the capital are being slowly constructed, to the extreme north at Antsirane and to the east at Tamatave. Population, about 72,500. See MADAGASCAR.

TANCRED, *tang' kred* (about 1050-1112), prince of Antioch. With his cousin Bohemund he joined the First Crusade, swore allegiance to Alexius, the Greek emperor, and took active part in the siege of Antioch. He soon joined himself to Godfrey of Lorraine, and in 1099 assisted in the capture of Bethlehem. During

the siege of Jerusalem he secured much booty and strengthened his power, shortly thereafter being made prince of Galilee. Between the years 1100 and 1103 he served as regent of Antioch during Bohemund's captivity. Two years later the power was restored to Tancred, who had by this time also secured possession of the government of Edessa. In 1107 his strength wrested Cilicia from the Greeks, and constantly his attacks were directed against Northern Syria. Tasso has immortalized the name of Tancred in his famous *Jerusalem Delivered.*

TANEY, *taw'ni,* ROGER BROOKE (1777-1864), one of the most famous Chief Justices of the United States Supreme Court, the jurist who gave the decision in the famous Dred Scott Case (see DRED SCOTT DECISION). This verdict was one of the important factors in the anti-slavery struggle that helped to bring on the War of Secession. Taney was born in Calvert County, Maryland, and was educated at Dickinson College (Pennsylvania). After studying law in Annapolis he was admitted to the Maryland bar in 1799, and a few years later established himself in Baltimore. President Andrew Jackson appointed him Attorney-General in 1831, and in 1836 he succeeded John Marshall as Chief Justice.

TANGANYIKA, *tahn gahn ye'kah,* the longest fresh-water lake in the world, and one of the deepest, situated in the east-central part of Africa, 175 miles southwest of Victoria Nyanza (see map, opposite page 81). It is 400 miles in length, and but twenty to forty miles in width, and its area is over 12,000 square miles. It is one and a half times as large as Massachusetts. The waters of Lake Tanganyika reach the Congo River by way of the Lukuga, which flows from it on the west, and the lake is fed by several small streams whose sources are in the surrounding mountains. Profuse growths of tropical plants are found on its shores, and its waters abound in fish, crocodiles and hippopotami.



LOCATION MAP

The long, narrow lake is Tanganyika; above, to the northeast, Victoria Nyanza; below, one-half visible, Nyassa. The small corner map shows in the black area the part of the continent appearing in the larger map.

Tanganyika was first viewed by Europeans in 1858, when the Arabian town of Ujiji, on its eastern shore, was visited by the Burton and Speke expedition. It was at this place, in 1871, that Dr. Livingstone was found by Stanley. The latter explored the whole lake in 1876. Great Britain, Germany and Belgium have established stations on the shores of the lake, and the Germans, early in 1914, completed a railroad (777 miles) extending across German East Africa from Dar-es-Salaam, on the Indian Ocean, to Tanganyika. The trip is made in two days. At the outbreak of the War of the Nations Belgium was constructing a line to run between the Upper Congo and the west shore of the lake.

TANGERINE, *tan'jer een,* a variety of orange named for Tangier, Morocco, where they were first found, and said to have been produced in America from the *mandarin* orange. The tangerine is somewhat flattened, and is of a deeper color than the common orange. The peel is easily separated from the pulp, which is sweet and juicy. Although they are smaller than the common orange, tangerines are highly prized by many on account of their flavor. They are raised in most of the states bordering on the Gulf of Mexico.

TANGIER, *tan jeer',* a picturesque old town of Morocco, of which it is the principal seaport. It is situated near the western entrance to the Strait of Gibraltar, about thirty-five miles southwest of the town of Gibraltar (see map, opposite page 81). From the sea the town has the appearance of a great amphitheater, with white houses rising tier on tier; at the highest point, on a plateau to the north, is an old castle, now a crumbling ruin. The tourist in Tangier is reminded of an ancient civilization at every turn of the narrow, winding streets, which are too steep to permit travel by vehicle. Littered with refuse and swarming with snake charmers, jugglers, venders, donkeys and camels, they present a panorama of typical Oriental life.

Besides the whitewashed houses of the native inhabitants, the place has synagogues, mosques, a Roman Catholic chapel, the sultan's palace, the residence of the French governor and several European shops and modern hotels. Electric lighting and telephones are modern innovations that have found a place here, and there is submarine cable and telegraph service to various points. Tangier and

a surrounding district (140 square miles in all) have been constituted an international district (see MOROCCO). Population, estimated to be from 35,000 to 46,000. There are about 6,000 Christians and as many Jews. The latter control most of the trade.

TANNHÄUSER, *tahn'hoi zer,* the hero of a German folk tale of the Middle Ages, a knight who was lured into the Venusberg, a hill in the Thuringian Forest, where Venus held her court. Under her spell, so runs the story, he remained given up to lustful pleasures till roused by the voice of the Virgin Mary. He then sought absolution from Pope Urban IV at Rome, but was told that the wand in the Pope's hand would sooner bud and bring forth leaves than that he should receive pardon; and so he returned, hopeless, to the Venusberg. After he had disappeared the Pope found that his wand had sprouted, but though he sought in all lands, the young knight could never be found.

This legend is the basis of Wagner's opera, *Tannhäuser.* In this version the knight, after he has escaped from the Venusberg, is saved from being put to death for singing unholy songs by the intercession of Elizabeth, who loves him. She herself dies of grief when he is refused absolution. Saved from reëntering the Venusberg by hearing Elizabeth's name, Tannhäuser returns, only to meet her funeral cortége. Thereupon he throws himself upon her bier and dies, but the blossoming of his pilgrim's staff indicates that he has received forgiveness.

The opera has many beautiful melodies, among the best known of which are the stately *Pilgrims' Chorus* and *Address to the Evening Star.* The latter, created for the leading tenor rôle, is one of the most exquisite songs ever composed. *Tannhäuser* was first produced at Dresden in 1845. It has always been one of the most popular in the Wagnerian series.

Consult Baring-Gould's *Curious Myths of the Middle Ages.*

TANNIN, *tan'in,* or **TANNIC ACID,** *tan'ik as'id,* a general name for several vegetable compounds, especially those from oak, hemlock, sumac and valonia, which are used in tanning hides. They occur naturally in tea and coffee and in galls on plants produced by the larvae of insects (see GALLS). The tannin of commerce is an almost colorless, odorless powder, soluble in water, with a bitter, puckery taste. With iron salts it gives a blue-black coloration, the basis of many inks. It is a mordant in calico printing, and a medicine for eruptions, hemorrhage and diarrhoea.

TANNING, *tan'ing,* the process of making from the skins of animals the useful substance known as leather. The name is taken from that of the principal substance used in the process—tannin—a vegetable compound obtained from the bark of the oak, hemlock and other trees. Raw hides, soaked in tannin solutions, undergo a complete transformation, for the solution brings about certain chemical changes in the skins that render them soft and pliable. (For details of the process, see the article LEATHER.)

Chrome tanning is the name of a more recent process involving the use of chromium compounds. Its advantage lies in the fact that by this method but a few hours, instead of weeks or months, are required to convert the skin into leather. About two-thirds of the glazed kid used by American manufacturers is chrome tanned, but the operation is not successful in the case of sole leather. Chrome-tanned leather is extremely resistant to water, so much so that it cannot be dyed after it has once dried.

Consult references at the end of the article LEATHER.

TANSY, *tan'zi,* an herb of the composite family, whose leaves and flowers have a bitter taste and a powerful aromatic odor. At one time young tansy leaves were used by the housewife as a flavoring for omelets, pastry and other foods, but this custom is no longer common. Oil of tansy, yielded by the leaves, is poisonous, but is used in medicines to a limited extent. The plant grows commonly along roadsides, and is also cultivated in gardens. It bears dark green, featherlike leaves, and flat-topped, yellow flowers, which appear at the top of the stem. Tansy is a native of Europe, and was introduced into North America probably as a medicinal plant. Herb doctors formerly prescribed tansy tea for colds. The *yarrow* is sometimes wrongly called tansy.

TAN'TALUS, in mythology, a Grecian king who was said to be the son of Jupiter and the father of Pelops and Niobe. According to the legend he killed his son Pelops and served him as a dish to the gods, who in punishment condemned Tantalus to terrible sufferings in Hades. Plagued by an unquenchable thirst, he was made to stand immersed to the chin in water, which always receded when he tried to drink; and gnawed by never-ceasing hunger, he saw hanging above him fruit-laden branches which always swung away when he tried to reach them. From this legend the word *tantalize* is derived.

TAOISM, *tou'iz'm,* a philosophical system originated in China in the sixth century B.C. by a sage known as Lao-tse. He was a contemporary of Confucius, and these two great thinkers are known to have taken counsel together. At the present time the Chinese venerate the name of Lao-tse almost as much as that of Confucius, and Taoism holds an important place among the Chinese religions. It is, however, a debased and degenerate form of religion, with no suggestion of the lofty ideals of its founder. The priests of Taoism claim to have magic powers, and the ritual is a combination of witchcraft and demonology. The principles laid down by Lao-tse are difficult to explain, but he seems to have attempted to point out a way to right conduct and true happiness.

Consult Parker's *Studies in Chinese Religion;* Kennedy's *Religions and Philosophies of the East.*

TAPAJOS, *tah pah zhosh',* one of the principal branches of the Amazon River, which rises in the southern part of Brazil, midway between its eastern and western boundaries, and flows in a northwesterly, then a northeasterly direction, discharging into the Amazon near Santarum, after a course of about 1,200 miles. Its basin lies between those of the Madeira and the Xingu. It is navigable by small vessels almost its entire length.

TAPESTRY, *tap'es tri,* an ornamental fabric used for decorating the walls of churches and palaces, and as a covering for windows, archways, furniture and floors. Tapestries are made by a special process of weaving, described as follows by an authority on the subject (Charles M. Froulke):

> Tapestries are made by interweaving variously colored woof threads with undyed warp threads after the warp threads have been stretched upon a loom either vertically or horizontally. This interweaving is done with an implement called a *broche* in French, which is neither a shuttle nor a bobbin, but partakes of the character of both, and for which there is no equivalent word in English. The picture represented is developed upon the warp by the different colors of the woof threads. Needles are never used in weaving tapestries. In the process of weaving the woof becomes practically an integral portion of the completed structure.

Tapestry making, which dates from antiquity, reached its artistic heights in the fifteenth century. The industry was then centered at Arras, in Flanders (now a city of France), and so excellent were the tapestries made there that the name of the city was applied to the fabric itself. In Shakespeare's *Hamlet,* to cite a familiar instance, Hamlet kills Polonius by driving his dagger through the *arras* behind which the eavesdropper is hidden. Antwerp, Brussels, Bruges, Lille and Valenciennes also developed as important centers of tapestry making, and the art became nationalized both in France and in Flanders.

In Paris, early in the seventeenth century, a factory under royal patronage was established in the dye works of the Gobelin family, and in 1662 the property was transferred to the control of the state. Gobelin tapestries became world famous, and the present museum connected with the establishment is one of two in the world in which tapestries and textile fabrics alone are exhibited. The other is in Florence. In the Gobelin museum may be seen tapestry reproductions of many of the great masterpieces of painting.

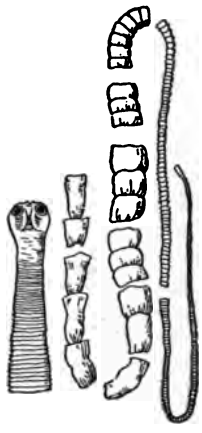
There are also valuable state collections of tapestries in Madrid and Vienna, and throughout the European continent; throughout the civilized world there are countless beautiful fabrics preserved in mansions, castles, cathedrals and museums. These tapestries picture historical events, scenes from legend and mythology, Biblical episodes and personages, flowers, conventional designs, heraldic devices, coats of arms, etc. Among the famous specimens of this art is a series illustrating scenes in the life of the Apostles, copied from cartoons made by Raphael, and now in the Vatican. The celebrated Bayeux Tapestry in Bayeux, Normandy, is really an example of embroidery. R.D.M.

Consult Hunter's *Tapestries: Their Origin, History and Renaissance;* Thomson's *History of Tapestry.*

TAPE'WORM, an animal parasite that lives in the intestines of human beings and seriously impairs the health. It consists of a very small head and many body and tail segments, and may vary in length from a few inches to five or six yards. The parasite grows by the formation of new segments, or buds, which develop behind the head and are continually pushed backward as others form. The tail segment is therefore the oldest. The head has a ring of four sucking disks, by means of which the animal attaches itself to the mucous membrane of the intestine. It obtains food by absorbing nourishment through its skin; the body floats freely and can take in nutriment from all sides. There are no digestive organs, and there is no mouth. Fertilization of eggs occurs in each division of the worm, and when the embryos reach a certain period of development some of the end sections separate from the others and

pass out of the victim's body. It is the appearance of these pieces of worm that proves the existence of the parasite in the intestine.

The symptoms of a person thus afflicted are an unusual appetite, loss of weight, pains in the abdomen, restlessness and lassitude. One troubled in this way should consult a physician and obtain a prescription for destroying the parasite. The head, a tiny, blackish object, must be secured, or the worm will grow again. Tapeworms enter the body through the eating of poorly-cooked pork or beef. C.B.B.



THE TAPEWORM
At the left is shown the head, considerably enlarged. The segments are parts of the worm.

TAPIOCA, *tapio'ka,* a food starch obtained from the roots of cassava, a plant of the tropics, used chiefly in the preparation of a nutritious pudding. Cassava, which belongs to the same botanical family as the milkweed, is native to South America, but is cultivated in the West Indies, and in parts of Asia, Africa and the United States, its growth in the last-named country being confined to Florida and a narrow strip of land along the Gulf of Mexico from Florida to Texas. This interesting plant is not raised from the seed, but from the canes or stalks of the previous season, which are cultivated in much the same manner as sugar cane. The roots sprout from the joints, extending out on all sides in a huge cluster, in some cases attaining a length of three feet or more.

There are two general classes of cassava, the sweet and the bitter. It is from the latter that the tapioca of commerce is obtained. The roots are first washed, then cut, ground and reduced to a pulp, after which the mass is strained until all the starchy particles are separated from the fibers. The moist, starchy mass is then placed on hot iron plates, and in the process of drying the starch grains form the small, irregular, translucent balls known in the markets as pearl tapioca.

The pudding made from tapioca is a popular dessert, and is nutritious and easily digested. It is often served with sugar and cream or with a cream sauce. Apple or peach tapioca pudding, covered with a frosting made of white of egg and sugar, or served with cream sauce, is an attractive dish. Any cook book contains a number of suggestions as to ways of preparing this food for the table. Tapioca is rich in carbohydrates (starch and sugar), the proportion of these being eighty-eight per cent; water is present to the extent of 11.4 per cent, and there are small amounts of protein, fat, ash and fiber. The food value is 1,650 calories per pound (see CALORIE). Tapioca is also used in thickening soups. See CASSAVA.

TAPIR, *ta'per,* a group of forest animals consisting of five species, four of which are found in the western hemisphere. The chief characteristics of the tapirs are a clumsily-built body, short, stout legs, thick neck, and nose prolonged to form a movable trunk, or proboscis. They belong to the odd-toed animals; the front feet have four toes and the back ones, three. Thus they are allied to the horse and the rhinoceros. They are solitary, amiable creatures, that live in the depths of the forests, and frequent regions near water, in which they delight to plunge and bathe. They feed on shoots of trees, fruit and other vegetable food, which they draw into the mouth through the proboscis.

There are two species in South America, the most common of which inhabits the forest regions east of the Andes; the other dwells high up the slopes of these mountains. In Central America there are two species of hoglike tapirs, the smallest of the family. All of the American tapirs are of a uniform dark brown color when grown, but the young are marked with

TAPIRS
Above, a South American species; below, Malayan, or Asiatic.

fawn-colored stripes and spots. The Old World species is found in the Malayan region. It is larger than the American tapirs, and very curiously marked, as its back, rump and sides are white, and the rest of the body a glossy black,

the two colors standing out prominently. The young, however, are marked like the young of the American species. Tapirs are hunted by the natives for their flesh and hides.

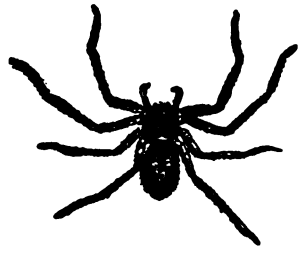
TAR. When used without any qualifying word this term refers to *wood tar,* the product of the special distillation of several kinds of wood, including pine, fir and larch. *Coal tar,* a by-product obtained in the manufacture of illuminating gas from bituminous coal, is always referred to by that name. (For a full discussion of this product, see page 1448.)

Wood tar is a dark-colored, semifluid substance, having a strong, pungent odor. It is used for coating and preserving timber exposed to the weather, for calking seams in boats and sidewalks, and in the construction of roofs. Medicinally it is valued for its antiseptic qualities, and is used in the preparation of ointments and lotions for treating skin diseases. Tar is also an ingredient of various cough mixtures, especially that yielded by pine wood. There are two methods for producing tar—the method of stacking and slow firing, and that of distilling it in retorts or ovens. The latter is the more economical and up-to-date, and it makes possible the isolation of valuable by-products. Among these is wood pitch, which is employed in the manufacture of varnish and artificial asphalts.

The stacking method, though crude and wasteful, is still practiced in the rural districts of North and South Carolina, Georgia and Alabama. Long-leaf pine is extensively used in these localities. Sticks of green wood are heaped to form a conical stack, the whole is covered with damp earth and sand, and the wood is permitted to burn slowly for several days. As the tar is melted out of the wood it is collected in a large pan at the bottom of the stack, then conveyed through a pipe into a barrel.

TARANTO, *tah'rahn toh,* a fortified city and seaport in Southern Italy, situated on a rocky island lying between the Gulf of Taranto and the Little Sea, an inlet of the gulf (see map of Europe, following page 2092). For centuries Taranto has been famous for its oyster and mussel fisheries, which give employment to great numbers of inhabitants. An esplanade extends along the shore, but the town is poorly built, with narrow streets and small houses. The structures of note are a castle, a cathedral, the palace of the archbishop, a museum of antiquities and a nautical school. Taranto is an important maritime arsenal and torpedo-boat station, and repairs for the Italian Mediterranean squadron are made here. The place occupies the site of Tarentum, one of the leading cities of the ancient Greek world.

TARANTULA, *ta ran'tu la,* a large spider named for Taranto, a city of Southern Italy, where it was first closely observed and where it is still found in great numbers. Formerly its sting was supposed to cause *tarantism,* a peculiar dancing disease. The name, first applied in Europe, is now commonly given to any of the large, hairy spiders abundant in the Southwestern United States and in Central America, from which they are occasionally transported to temperate climes in barrels of fruit. Tarantulas catch their prey, not in a web, as do many spiders, but by swiftly pursuing and attacking it. Their homes are little wells in the ground, lined and covered with silky webs. Although their bite is painful, it is no more dangerous than that of other spiders, and, so far as known, is never fatal.



TARANTULA
About one-half actual size.

TAR'BELL, IDA MINERVA (1857-), an American writer famed for her sociological and historical investigations, was born in Erie County, Pa. She was graduated from Allegheny College, and from 1883 to 1891 served as associate editor of *The Chautauquan.* After studying for three years at the Sorbonne and the Collège de France, in Paris, she became, in 1894, associate editor of *McClure's Magazine,* a position which she held until 1906. In that year she accepted a similar position with the *American Magazine.* Besides a *Life of Abraham Lincoln, Life of Madame Roland, Short Life of Napoleon Bonaparte* and *The Tariff in Our Times* she wrote other biographical and historical sketches, numerous articles for magazines, and the book for which she is best known, the *History of the Standard Oil Company.* This last-named work, by opening the eyes of the people to the power and the methods of great corporations, had a very real effect on business in the United States. Another volume which marks her as a keen observer is *The Business of Being a Woman.*

TARE, *tair,* a low climbing plant which is also known as *vetch.* It has compound leaves,

containing from four to seven pairs of leaflets, and bears purple flowers resembling the pea blossom. In Europe, because it flourishes in poor soil, it is grown extensively for green fodder, and is used also for hay and as a fertilizer. There are two varieties, the *summer* and the *winter* tare, besides the *wild* tare. The plant mentioned in the parable of the tares and wheat, found in *Matthew* XIII, 24-30, was probably a species of grass called *darnel*.

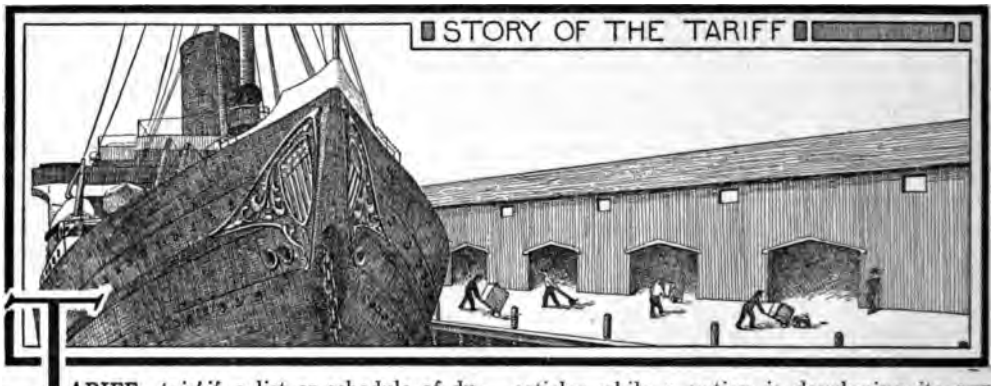
TAR'GET, a mark at which to shoot. The name is derived from *targo* or target, a small, round shield carried on the left arm and used by Highlanders of Scotland until the seventeenth century. Targets to be shot at with arrows, as in archery, are usually made of a canvas-covered frame filled with straw, with rings surrounding the center, or *bull's-eye*. The targets for rifle shooting are usually square, white, with a black bull's-eye, and two rings invisible to the person shooting. If the bullet hits the bull's-eye, five points are credited to the marksman; the inner circle counts three, and the outer circle one, point. This kind of target for military practice is now practically obsolete, except for elementary lessons in shooting. Advanced practice targets consist of silhouettes of men painted on canvas in natural colors, head and shoulders, men lying down, mechanical running men and disappearing targets, which bring the shooting practice as near as possible to actual war conditions.

Valcartier Camp, Quebec, is equipped with what is considered the finest and most varied shooting ranges in the world for military purposes.

There are to be found in nearly every town in the United States shooting galleries where marksmen may test their skill on payment of a small sum, by shooting at a wide variety of moving and stationary targets.

An illustration of the standard target used in archery is shown in the article ARCHERY.

TARGUM, *tahr'gum,* a paraphrase of the Old Testament, in Aramaic, the language used by the Jews after the Exile, made for use in the synagogue worship. At first the Targums were merely spoken explanations of the Hebrew text, but they gradually took on a fixed form and were reduced to writing. When the law was read, the paraphrase was given after it, verse by verse, but in case of the Prophets three verses might be read and then the Targum. There are three targums extant on the Pentateuch, one on the Prophets, and targums on *Psalms, Job, Proverbs, Song of Songs, Ruth, Lamentations, Esther, Ecclesiastes* and *Chronicles.* See ARAMAIC.



TARIFF, *tair'if,* a list or schedule of duties levied on goods sent to or arriving from foreign lands. In its original meaning a tariff was not a tax or duty, but rather a list of articles on which duties were levied. However, for many years in law the word has meant both the list and the rate, or duty. The word is derived from the Spanish *tarifa* and the French *tariffe,* which mean a price list or rate book.

Tariffs are levied for three purposes: (1) as a means of obtaining revenue for a country; (2) as a means of keeping out certain foreign articles while a nation is developing its own manufactories for such goods; (3) and as a means of punishing or retaliating upon other nations for creating high rates. This last form is seldom employed now, but its opposite, *reciprocity,* whereby one nation lowers its duties for another if the latter returns the favor, is very common. A country which has a tariff for revenue only, without attempting to secure protection for its industries, is known as a free-trade nation. The only important nation which maintained practically free trade

up to the time of the War of the Nations (1914) was Great Britain Free trade does not mean freedom from all tariff restrictions; Great Britain levies a revenue duty on tea, sugar, coffee, wines and a few other articles which could not possibly be raised at home.

Early Tariffs. The custom of collecting such revenue is very ancient. The early Egyptians and Babylonians levied import duties at their ports and city gates, while the government of Athens laid a duty of two per cent on both incoming and outgoing merchandise. Moreover, a duty or tax was collected by the Athenians for the use of their harbor by foreign vessels. The Roman government, about the time of Christ, was demanding five per cent of the value of goods as a regular import duty, and under the later emperors this was increased to twelve and one-half per cent. Between the years 800 and 1500 the tariff conditions in Europe were perplexing. Every petty feudal lord claimed the power to collect a revenue on goods passing through his lands, and oftentimes a merchant going from one city to another was obliged to pay such a fee every ten or fifteen miles. Merchandise going overland from Rome to Germany or Holland sometimes paid in tolls many times its original price.

England. It is certain that duties were collected at the London ports as early as 980, and by 1380 these were so important that Chaucer, the first great English poet, considered himself honored when appointed to the post of supervisor of London customs. Under Edward I, who ruled from 1272 to 1307, special duties were levied on goods brought by foreign merchants, thus establishing the first tariff for protection in England. Such duties were called *poundage,* because they were based on weight. In the seventeenth century the ruler acquired the further right of taking two tuns or barrels of wine from every twenty imported; this tax was called *tunnage.* All these taxes on imports were considered temporary and were frequently increased, decreased or dropped; but toward the close of the seventeenth century duties were made permanent, and were levied expressly for the purpose of paying the government debt.

Gradually it had become the custom to adjust the duty to the value and not the bulk or weight of an article, and from time to time, between 1545 and 1800, rate books were issued by the government to show exactly what articles were thus taxed. The suffering of the British people, especially the Irish, because of a series of famines after 1840, caused Parliament to see that the islands could not produce enough cheap food for the inhabitants. The first great step towards free trade was the repeal of the Corn Laws in 1846, followed by the abolition or reduction of more than a thousand duties. Great Britain became, therefore, a free-trade country. The British colonies failed to follow the mother country in advocating free trade; Australia, South Africa and Canada have insisted upon protective rates for numerous commodities. India is the only important British colony which has free trade.

Other Countries. Countries not so peculiarly situated have not been inclined to adopt free trade. In France, for instance, high tariff was the rule until 1790, not only at the entrance ports but between each little province within the country. The internal tariff was abolished during that year, but with the exception granted by a few reciprocity treaties France still demands a protective tariff on foreign goods. Germany had only moderate protective rates until 1902, when the duties on numerous agricultural and manufactured articles became almost prohibitive. Other European nations have followed the examples of France and Germany, and few civilized countries are now without high duties.

United States. From the earliest days of the American nation, peculiar circumstances seemed to compel the adoption of protective rates. The bitterness between Great Britain and the new country had caused both Englishmen and Americans to desire each other's goods kept out, and it was looked upon as an act of patriotism in an American to discourage the importation of foreign merchandise. The immense debts of the Revolution and the War of 1812 made necessary the gathering of every available penny of revenue, while the feeble and easily-frightened industries of the new land needed every possible aid. In time, when these infant industries became strong, their very strength was an argument for the continuance of the policy that built them up.

The first national tariff law in the United States was that of 1789. Although the law states that one of its objects is the "encouragement and protection of manufacturers," the duties levied by it were so moderate that the protection granted was slight. This act was superseded by the tariff of 1816, a distinctly protective measure. The duties were not high —the highest rate was twenty per cent—but they were in several cases sufficient to demonstrate the possibilities of protection to home

industry. In the next year the internal revenue tax, which had prevailed since the War of 1812, was abolished, and President Monroe in a message to Congress frankly recommended a tariff solely for protection. Efforts were made in Congress to secure such a law, but no important tariff act passed both Houses until 1824. This law, which raised the average duty to thirty-seven per cent, was based on the principle that such foreign-made goods as competed with domestic products should be excluded from the American market.

The tariff was rapidly becoming the most important political question. The loose constructionists, under the leadership of Henry Clay, were the expounders of the "American system," which included a high protective tariff. The Tariff of 1828, generally called the "tariff of abomination," laid almost prohibitive duties on woolen and cotton goods and a few other commodities. This act aroused great opposition in the South, which then exported each year about $25,000,000 worth of tobacco, cotton and rice to Great Britain, whereas the imports of manufactured goods from Great Britain amounted to $15,000,000. The South feared that prohibitive duties would lead to retaliation by Great Britain and thus kill its export trade in raw materials. The South also declared that the Constitution gave Congress power to levy duties for revenue only and not for protection. The protests against this act culminated in the nullification movement, led by John C. Calhoun. Congress modified the duties slightly in 1832, but still recognized the principle of protection.

As the tariff of 1832 was still unsatisfactory to the South, in 1833 a compromise was effected whereby the duties would be gradually reduced until 1842, after which year there was to be a uniform duty of twenty per cent on all imports. In 1842, however, the Whigs passed a new law providing high duties. When the Democrats were returned to power in 1845 they promptly passed a new bill, the Walker Act, which was called a free-trade measure; it lowered some duties, but, in fact, it retained many of those which had been the subject of controversy in the preceding half century. In 1857 the duties were lowered again, this time without much opposition, because there was a growing surplus in the national treasury.

The policy of decreasing the duties was abandoned at the outbreak of the War of Secession. The sentiment against protection had gradually increased after 1828, and except for the period of 1842 to 1846 the duties had been slowly lowered. Under the stimulus of war, Congress passed the Morrill Act of 1861, raising the average duty from twenty to twenty-seven per cent. During the next four years not a session of Congress passed without some increases in duties. After the war, except for one law in 1867, the tariff question was lost for fifteen years in a mass of other legislation which seemed more important. In general, the operation of these protective tariffs coincided with an astonishing growth in manufactures. There was a feeling throughout the country that protection was necessary and beneficial.

About 1880, however, the government's annual surplus began to increase, and Congress spent it wastefully. The demand for a real remedy, a lower tariff, led to the appointment of a Tariff Commission in 1882 to ascertain the effect of the existing tariff laws and to recommend changes in them. As the commission and Congress were both controlled by high protectionists, the resulting law of 1883 lowered but few schedules; it was designed to give only such reductions as would silence the demands of the opposition. The tariff became one of the issues of the campaign of 1884, which resulted in the defeat of the Republicans and the election of Grover Cleveland, the first Democratic President since the War of Secession.

The Mills Bill of 1888, embodying the low-tariff ideas of President Cleveland and his party, was passed by the House, but failed to pass in the Senate, which the Republicans controlled. The Republicans, in their turn, interpreted the outcome of the campaign of 1888, which returned Harrison, a Republican President, as an endorsement of high tariff. The result was the McKinley Tariff Act of 1890, which raised the average level of duties to a higher point than ever before. A noteworthy feature of the act was the reciprocity clause, added through the influence of James G. Blaine, then Secretary of State. A month after this act was passed the Democrats secured control of the House as the result of the November elections. In the ensuing Presidential campaign the tariff was again the issue, and Cleveland's second election seemed to make a lower tariff inevitable. Then the severe panic and crisis of 1893, followed by depression in all lines of business, made caution and compromise necessary. The Wilson Bill of 1894 made so few reductions that Cleveland showed his disapproval by allowing it to become a law without his approval. (See CLEVELAND, GROVER.)

The financial and economic crisis of 1894 to 1896 foreshadowed another change in the tariff. Although the campaign of 1896 was fought solely on the question of free silver, President McKinley called a special session of Congress to consider the tariff. In the resulting Dingley Tariff Act of 1897, protective duties reached their maximum, especially those on wool, silks, linens and hides. During the Spanish-American War a number of special duties, particularly one of ten cents a pound on tea, were levied for revenue purposes, but these were repealed in 1901 and 1902.

The industrial development of the United States since 1890 has been little short of marvelous. The Republicans, almost without exception, have attributed this growth to the protective tariff. The Democrats, with equal unanimity, have attributed it to the country's enormous natural resources, and have pointed to certain evils connected with industrial control which they claimed were caused by the tariff laws. The need of some readjustment of duties became clear about 1904, and after that date both the great political parties declared themselves in favor of tariff revision. The Republicans, however, paid no attention to the tariff during Roosevelt's administration, and when they did consider it, in the first year of Taft's administration, passed the Payne-Aldrich law. There is still some dispute as to whether this act raised or lowered the level of the duties as levied under the Dingley tariffs. The changes were so numerous and so complex that nobody was quite sure what the effects of the law would be. The President defended the law as the best possible under the circumstances, but the public expressed its disapproval by returning a Democratic majority in the House of Representatives a year later.

In 1913, immediately after his inauguration, President Wilson called a special session of Congress to enact a new tariff law. The new bill, known as the Simmons-Underwood Tariff Act, provided many changes in the rates. The duties on cotton and woolen goods were greatly lowered, and raw wool was placed on the free list. Sugar, until May 1, 1916, paid a slight duty; thereafter it was entered free. Other articles on the free list are many chemicals and metals, lumber, coal, boots and shoes, cement, asphalt, wood pulp, and original works of art. About 300 rates remained unchanged, over 900 were reduced, and eighty-six were raised. Of the eighty-six increases, over half were in the chemical schedule, the remainder being on gold and silverware, precious stones, perfumes and other luxuries. To compensate for the loss in revenue which the reductions would cause, the act provided an income tax.

One of the greatest difficulties to be faced in the preparation of a tariff for the United States is the extent of the country's area and the variety of its industries. Thus the clothing manufacturers of the East and middle West want free wool, but the sheep rancher in the far West demands protection. The sugar planter in the South needs a bounty or an import duty to enable him to compete with the planters in Cuba and the tropical regions, but the sugar refiner and many other people ask for free sugar. Thus a general tariff act always involves compromise, lest the interests of one section or one class be sacrificed to those of another. Occasionally the interests of one section must yield for the good of the whole. W.F.Z.

Consult Dewey's *Financial History of the United States,* in those chapters relating to the tariff; Taussig's *Tariff History of the United States.*

Related Subjects. The following articles in these volumes will give further information on the subject of the tariff, and will make clear certain references in the above discussion:

Democratic Party	Protection
Free Trade	Reciprocity
Nullification	Republican Party
Political Parties, subtitle *Political Parties in the United States*	Tax and Taxes

TARKINGTON, *tahr'king tun,* NEWTON BOOTH (1869-), an American novelist, born in Indianapolis, Ind. He was graduated from Princeton University in 1893, and turned his attention at once to literature. *The Gentleman from Indiana,* published in 1899, made him well known throughout the United States, and his reputation was increased by the appearance of *Monsieur Beaucaire,* a charming and artistic story of France. This last-named book has been dramatized, and was played with much success by Richard Mansfield. Tarkington's next novels, among which are *The Two Vanrevels, Cherry* and *The Conquest of Canaan,* were not so popular, but his

BOOTH TARKINGTON

comedy, *The Man from Home,* which proved a very successful stage production, greatly increased his popularity. Other later works were *Cameo Kirby, Springtime, Your Humble Servant, Penrod* and *Getting a Polish.*

TARPEIAN, *tahr pe'yan,* **ROCK,** a steep rock forming part of the Capitoline Hill at Rome. According to tradition it was named for Tarpeia, the daughter of the governor of the Roman citadel in the time of Romulus.

THE TARPEIAN ROCK
As it appears in the twentieth century.

Desiring greatly the golden bracelets worn by the Sabine enemies of Rome, Tarpeia treacherously opened to them the gate of the fortress, having first gained from the Sabines a promise that they would give her what they wore on their left arms. Once within the citadel they cast their shields upon her and crushed her to death. She was buried at the foot of the rock, which ever afterward bore her name. In later periods of Roman history those convicted of treason were ordinarily killed by being thrown from the Tarpeian Rock.

TARPON, *tahr'pon,* a large game fish shaped somewhat like a salmon, found in West Indian waters and off the southern Atlantic coast of the United States. It grows to the length of nearly six feet and frequently weighs 100 pounds. The flesh is coarse and not desirable for food, but the large, tough, silvery scales are used in decorative designs. Tarpon fishing is one of the best American sports, for the fish is a skilful fighter and very strong.

TARQUINIUS, *tahr kwin'i us,* LUCIUS, surnamed PRISCUS, the fifth legendary king of Rome, who reigned from 616 to 578 B.C. He was not of royal blood, but succeeded in gaining the throne on the death of Ancus Marcius, to whose sons he had been appointed guardian. His reign was one of the periods to which later Rome looked back longingly in times of trouble or depression. He waged successful war against the Sabines and the Latin cities, made vassals of the powerful Etruscan cities (see ETRURIA), and began many great public works, among which were the *cloacae,* or sewers, the Circus Maximus, and the Temple of Jupiter, on the Capitoline Hill. It was he, according to some legends, who acquired the Sibylline books, though other traditions connect these famous documents with Tarquinius Superbus. He was assassinated by the sons of Ancus Marcius.

TARQUINIUS, LUCIUS, surnamed SUPERBUS THE PROUD, the last of the legendary kings of Rome, whose reign was from 534 to 510 B.C. He was the son of Tarquinius Priscus and the son-in-law of Servius Tullius, whom he had put to death to secure his own accession. He at once annulled all of the reforms of his predecessor, depriving the lower classes of their rights and catering to the patrician class. His tyranny won for him general hatred, and the crime of his son, Sextus Tarquinius, against Lucretia precipitated a rising which drove Tarquinius from the throne and resulted in the founding of the Roman republic. Several unsuccessful attempts were made to replace Tarquinius on the throne, the most famous of which was that of Lars Porsena, celebrated by Macaulay in his *Horatius at the Bridge.*

TARSUS, *tahr'sus,* the most important town in ancient Cilicia, in Asia Minor, and the birthplace of the Apostle Paul. He spoke of it as "no mean city." Located in a fertile plain on the banks of the River Cydnus, twelve miles from the sea, Tarsus was a center of commerce from very early times. In the days of Paul it was one of the "free cities" of the Roman Empire and was renowned as a center of education and culture. Modern Tarsus, though it has a population of 25,000, is a backward and unattractive Turkish town, with no features of interest other than a few ruins of the Roman era.

TARTAN, *tahr'tan,* from the French *tiretaine* and the Spanish *tiritaña,* meaning a *thin woolen or silken cloth,* is the name of a worsted cloth checkered or crossbarred with threads of different colors. Tartan is historically associated with the costumes of the Highlanders of Scotland, and according to tradition each of the numerous clans had its own distinguishing tartan or plaid. Thus there was the tartan of Campbell of Argyll, light green crossed with dark green, with narrow, independent crosslines of white; the Macdonald of

Glengarry and Keppoch, red, with open, broad blue crosslines, and two independent blue crossings; the Macpherson, pale gray, four darker gray bars at crossings, the whole covered with red, double independent lines; and so on. The effect of a large number of these tartan costumes is suggested by Scott, in the *Lady of the Lake:*

> Scarce to be known by curious eye
> From the deep heather where they lie,
> So well was match'd the tartan screen
> With heath-bell dark and brackens green.

Tartan is not at the present time restricted to Scotland, but is worn generally in various countries. Numerous patterns are put out by manufacturers, and woolen, silk and mixed goods are used as materials.

Interesting information concerning the tartans of the Scottish clans may be found in Skene's *The Highlanders of Scotland.*

TARTAR, *tahr'tahr,* or **ARGOL,** *ahr'gol,* a substance deposited as a hard crust on the sides of casks during the fermentation of grape juice. Chemically it is known as impure acid potassium tartrate. Tartar varies in color from brownish-white to dark red, according to the color of the wine. It is important commercially as the source of cream of tartar (see CREAM OF TARTAR, for methods of preparation). The tartar that is formed on the teeth is a hard mixture of phosphate and lime deposited from the saliva. See TEETH.

TARTAR EMETIC, *e met'ik,* a medicinal preparation used in small doses as an emetic or to reduce fever and cause sweating. In large doses it is a violent, irritant poison. Tartar emetic acts on the stomach and intestines and exerts a depressing effect on the heart and nervous system, and is now only sparingly used. It should never be taken unless prescribed by a competent physician. It is prepared by making a paste of water, antimony oxide and acid potassium tartrate, boiling the mixture with water and letting the solution crystallize.

TARTARIC ACID, *tahr tahr'ik as'id,* a vegetable acid occurring as the potassium salt in many plants and unripe fruits, but especially in grapes. It is obtained by treating the tartar deposited in wine casks (see TARTAR) with lime and sulphuric acid. It forms large, clear crystals easily dissolved in water, the solution effervescing and having a refreshing, sour taste. It is used in the manufacture of dyestuffs and baking powders, in dyeing and calico printing, in photography and as one ingredient of Seidlitz powders (which see).

TARTARS, or TATARS, *tah'tarz,* originally the name of the Mongolic races of Central Asia, but later extended to all the tribes ruled by Genghis Khan (which see) and his successors. *Tatar* is a Tungusic or Manchu word, meaning *archer* or *nomad,* and first occurred in the Chinese records of the ninth century in reference to certain Mongol tribes which were driven by the Khitans southward. The Mongols and Tatars were organized into one nation by Genghis Khan, whose father was a Mongol and whose mother was a Tatar. At the present time the Tatars are represented by the Fish-shin Tatars of Northern Manchuria, the Solons and Daurians of Northeastern Mongolia and the Manchus of China.

Tatar took the form *Tartar* at an early date by association of the word with Tartarus, or Hades, of classic mythology. The tribes bearing the name were greatly feared because of the atrocities they committed. The word *Tartar,* however, is not correct from the standpoint of etymology.

TARTARUS, *tahr'tahr us,* in early Greek mythology, a dark abyss surrounded by the fiery river, Phlegethon, where Jupiter imprisoned the rebelling Titans. Tartarus was later considered the place of punishment for all spirits of the wicked, and the name was used interchangeably with Hades. Aeneas, in his adventures in the abode of shades, comes to a point where the road divides, the right branch leading to Elysium and the left to Tartarus. In Vergil's *Aeneid* occur these lines:

> There rolls swift Phlegethon, with thund'ring sound,
> His broken rocks, and whirls his surges round.
> On mighty columns rais'd sublime are hung
> The massy gates, impenetrably strong.

TARTARY, *tahr'tahr i,* a name applied in the Middle Ages to that part of Asia including Manchuria, Mongolia, Turkestan and the southern part of Asiatic Russia. The Tartars were fierce and warlike, and had the reputation of being very cruel in war. The modern expression, "to catch a Tartar," means to find a resourceful opponent in one considered easy to overcome, either in combat or in a test of mental powers. There is also an expression, "Scratch a Russian and you find a Tartar," meaning that beneath the veneer of Russian civilization lies the ferocity of a Tartar. The Russians are teaching the world the present-day injustice of such a statement.

TASCHEREAU, *tash ro',* ELZÉAR ALEXANDRE (1820-1898), a Roman Catholic prelate, the

first Canadian to wear a cardinal's hat. Cardinal Taschereau was born at Sainte Marie de la Beauce, Que. He was educated at Quebec Seminary, with which he was then connected for nearly three decades, first as professor of moral philosophy and after 1860 as Superior. After 1860 he was also rector of Laval University. In 1862 Taschereau was made vicar-general of the diocese, and in 1871 archbishop. In the next year he founded the Hotel Dieu du Sacré-Coeur, a convent and hospital. In 1886 Pope Leo XIII elevated him to the rank of cardinal. He retired from the active administration of the diocese in 1894.

Sir Henri Elzéar Taschereau (1836-1909), younger brother of the cardinal, was a distinguished Canadian jurist. He was called to the bar in 1857, and established practice at Quebec. From 1861 to 1867 he sat as a Conservative in the Canadian assembly, and in 1871 became a judge of the superior court of Quebec. From 1878 to 1902 he was a puisne judge of the Supreme Court of Canada, and from 1902 to 1906 was Chief Justice. Knighthood was conferred on him in 1902. Sir Henri wrote *Notes and Commentaries on the Criminal Law of Canada; The Code of Civil Procedure in Lower Canada*, and *The Criminal Code of the Dominion of Canada.*

TASHKEND', or **TASHKENT'**, the largest city in Asiatic Russia and the capital of Russian Turkestan, is situated in the valley of the Chirchik River, fifty miles above the union of that stream with the Syr-Darya. The city is divided into two quarters, the old Asiatic and the new Russian. The latter is regularly built and contains academies, public libraries, a museum and theaters; in the old quarter are numerous mosques, and inns for the accommodation of caravans. Tashkend is an important center for the shipment of merchandise to Bokhara, Persia, Kashmir and India, and it has railroad connection with Krasnovodsk, 1,085 miles distant on the Caspian Sea, and with Orenburg, in Eastern Russia. Population (Asiatic and European nationalities), 1912, 271,650.

TASMANIA, *taz ma'ni a,* formerly called VAN DIEMEN'S LAND, an island forming one of the six states of the Commonwealth of Australia, separated from the southeastern part of the mainland by Bass Strait, 140 miles wide. The island is of triangular shape, 200 miles from north to south and 245 miles from east to west, covering an area of 26,215 square miles, or about as large as Virginia and Delaware combined. The population was 201,675 in 1911. The coast is remarkable for its bold headlands and picturesque inlets. The interior of the island forms a plateau with an elevation of between 3,000 and 5,000 feet above the sea level; this plateau contains many lakes, the principal being Lake Austrua, Lake Saint Clair, Lake Sorell, Lake Echo, Great Lake and Arthur's Lake. The mountain ranges bordering the central plateau do not reach a very great altitude, the highest point being Mount Cradle, which is elevated 5,070 feet above sea level.

LOCATION MAP
The island lies south of Victoria, a sister state of the Commonwealth.

The geological formation of Tasmania is intimately connected with that of Victoria, on the main Australian continent, to which it was joined until after the Miocene period. The island is well watered, possessing rivers which flow into the sea on the north, south, east and west. The soil is very fertile, and agriculture forms one of the chief occupations of the inhabitants.

The animal life of Tasmania is similar to that of Australia, except that the dingo, or wild dog of Australia, is not present. Tasmania has two carnivorous animals, the tiger and devil, or wolf, which are peculiar to that country. The kangaroo, opossum, kangaroo rat, wombat, the duck-billed platypus and the ant-eater are also common.

The climate is really delightful and more healthful than that of any other of the Australian states. The heat is not usually excessive, though during exceptionally hot periods the thermometer has been known to rise as high as 110° F., and it seldom drops below 47° F.

The principal wealth of the state consists of its copper mines. Gold, silver, tin and coal are also produced, the combined value of the mine production exceeding that of agriculture.

Tasmania sends six senators and five representatives to the Federal Parliament of Australia. Every person living in Tasmania for a period of twelve months who is over twenty-one years of age is entitled to vote. The franchise has been conferred on women. Elementary education is not absolutely free, a small fee being charged, but this is waived in cases of genuine poverty, which are rare.

The total mileage of the railroad systems in Tasmania amounts to about 620 miles, mostly owned by the state. Macadamized roads, kept in good repair, run throughout the island. The chief towns are Hobart, with 40,000, and Launceston, with 22,500, inhabitants. The government of Tasmania is similar to that of the other Australian states. There is a governor appointed by the Crown, a legislative council of eighteen members, chosen for six years, and a house of assembly, whose members are chosen for three years.

Van Diemen's Land, as Tasmania was first named, was discovered by Tasman, the Dutch navigator, in 1642, and named after his patron Van Diemen, governor of the Dutch East Indies. It was first settled in 1802 when a party of twenty-five convicts with several officials from New South Wales landed on the south coast. Little is known of the aborigines of Tasmania; they are extinct, but are supposed to have been of Australian origin. F.ST.A.

Consult Murray's *Tasmanian Rivers, Lakes and Flowers;* Smith's *A Naturalist in Tasmania.*

Related Subjects. The reader is referred to the following articles in these volumes:

Australia	Miocene Period
Hobart	Tasmanian Wolf

TASMANIAN WOLF, *taz ma'ni an wulf,* THE, also called ZEBRA WOLF, THYCALINE and POUCHED DOG, is a pouched animal (see MARSUPIALS) which resembles a wolf or wild dog in appearance. It is a native of Tasmania, an island belonging to the Australian Commonwealth. The Tasmanian wolf is usually about forty inches long, but sometimes attains a greater size. The short fur is grayish-brown, and there are black stripes across the back much like those of a zebra. The nose is long and sharp, and the tail is tapering. These animals were common in Tasmania in early days, but the European settlers succeeded in driving them into the mountains, after great depredations had been committed in sheepfolds and poultry yards. They are nocturnal in their habits, hiding in deep burrows or gulches in the daytime, from which they make nightly raids for food.

TASSO, *tas'o,* TORQUATO (1544-1595), one of the greatest of the Italian poets, was born at Sorrento. His father, a fifteenth century poet, took him to Rome at the age of ten and there gave him careful training in literature and history. At that time he showed evidence of a remarkable memory and could recite long portions from the works of Greek and Latin poets. He was sent at the age of sixteen to the University of Padua, Italy, to study law, but within a year produced a romantic poem in twelve cantos, entitled *Rinaldo.* This remarkable work, dealing with the legends of Charlemagne, surprised and gratified the Italian reading public but enraged the father, who wished the boy to confine his energy to the law. However, public admiration was so great that the young poet was at length permitted by his father to devote his time to literary study, and on invitation of the authorities at the University of Bologna went to that institution. In 1562 he had to leave the school because unjustly accused of writing certain bitter satires against the professors. He then returned to the University of Padua, where his admiration for Vergil's poetry became so intense that he determined to write an epic along the lines of the *Iliad.*

TASSO

At this time the Turks were harassing the Hungarians and the Italians, and the popular talk of another crusade against those invaders suggested to him the idea of basing the epic upon the adventures of Godfrey de Bouillon in a crusade to Jerusalem. Thus began the famous poem, *Jerusalem Delivered,* which, after Dante's *Divine Comedy,* is given rank as one of the greatest epics in the Italian language. While he was engaged in planning and writing portions of this long poem, he found a patron in Cardinal d'Este, who took him to one of the centers of Italian culture, the court of Ferrara. There, amidst magnificent surroundings, noted men, beautiful women and his own love affairs, he gained a multitude of experiences which he afterwards wrote into his epic. A quarrel with his patron sent him forth penniless in 1571, but Duke Alfonso of Ferrara sheltered him, and under the patronage of this nobleman he produced in 1573 *Aminta,* possibly the most beautiful of all Italian pastoral plays.

In April, 1575, he announced that his *Jerusalem Delivered* was finished, but before publishing it desired its examination by a body of churchmen lest the charge of heresy or infidelity be brought against him. The churchmen

demanded that all mythology and chivalrous adventures be omitted, and persecuted him with their criticisms. A blow on the head during a quarrel added to his mental discomfort, and in 1576 he showed signs of insanity. He had an idea that he was constantly being watched, and in June, 1577, while in the home of the Duchess of Urbino, drew a knife on a servant whom he considered a spy. He was taken to a country home, but escaped and wandered from town to town. In February, 1579, he returned to the court of Ferrara, and burst into the royal rooms with such signs of rage that he was confined as a madman. At length he was allowed to go to Naples, where he composed his *Jerusalem Conquered,* really a revision of the other epic with most of the chivalry omitted.

In 1593 he was ordered to Rome by Pope Clement VIII to be crowned for his poetry, but in the midst of the preparations he became ill and died in the Convent of Santo Onofrio, near the city. The pathetic story of his life has been used by such poets and writers as Goethe, Lamartine and Byron as a theme for poems and stories. The *Rinaldo,* the *Aminta,* a tragedy entitled *Torrismondo,* and *Jerusalem Delivered* are among the greatest of Italian writings, while the last-mentioned poem is classed as one of the world's noblest epics. R.D.M.

Consult Boulting's *Tasso and His Times;* Woodberry's *Inspiration of Poetry.*

TASTE, *tayst,* one of the five special senses —the one through which we recognize certain substances when they are dissolved in the mouth.. The sense of taste is located in the mucous membrane on the upper side of the tongue and the upper back part of the mouth. On this membrane are numerous minute elevations called *taste buds,* containing the endings of the nerve filaments which convey the impulse to the taste centers in the brain. When the sensation is registered by the brain centers it is identified as *sweet, sour, bitter* or *salty.* All taste sensations are formed by combinations of these or by combination of one of them with the sense of smell. These two special senses are very closely related, and it often happens that smell sensations are mistaken for those of taste. Also, when the sense of smell is deadened by a cold in the head, the victim usually complains that he cannot taste well, or that all foods taste alike. The "mouth watering" that occurs when an appetizing odor greets the nostrils is another example of a delicate relationship existing between smell and taste. In this case there is stimulation of the salivary glands, brought about by anticipation of the enjoyment of eating.

The sense of taste is one that can be trained. In the grocery trade, for instance, the buyers use this sense in appraising the quality of coffee, tea, butter and other commodities. It is also a sense that will become tired if not used with discretion, and since it adds greatly to one's ability to enjoy life, it should not be abused. People who indulge to an excessive degree in candies, highly-seasoned foods and the like impair their power to enjoy them. The ideal way is to eat plain food, as a rule, and delicacies but occasionally. If such a method is followed the sense of taste will not become vitiated. C.B.B.

Related Subjects. In connection with this discussion of taste, the reader may consult the following articles in these volumes:

Mouth	Smell
Senses, Special	Tongue

TATTOO'ING, the savage art of making permanent scars in patterns on the skin. It originated as a purely decorative custom, but among some races it grew to have a religious or tribal significance. Real tattooing can be

TATTOOING
As performed in Burma

practiced successfully only by light-skinned people, for it includes rubbing colors into the fresh scars. Needles of steel, bone or shell are used to puncture the designs in groups of lines and dots, and one or several colors are employed to permanently set the patterns. The Polynesians confine themselves to black, which turns to blue in the skin, but the Japanese use three or four pigments. Dark-skinned races practice a related art, *scarification,* or gashing the skin and rubbing in ashes or clay, which causes light, raised scars to form. Another method is to insert splinters of wood in the skin and set them afire, known as *branding.*

As civilisation spreads, tattooing dies out, though sailors of the most enlightened countries often have designs made on the forearm. In Europe the practice is confined chiefly to the criminal classes in large cities.

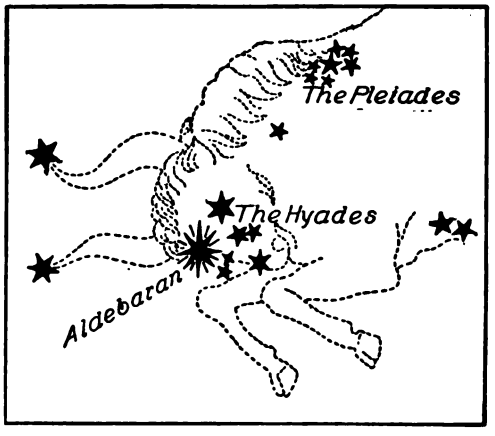
TAUNTON, *tahn'tun,* MASS., one of the county seats of Bristol County, is a manufacturing city in the southeastern part of the state, thirty-six miles south of Boston and seventeen miles northeast of Providence, R. I. It is on the Taunton River, which has been sufficiently deepened for river commerce at high tide, and is served by the New York, New Haven & Hartford Railroad and by an extensive interurban system. Taunton includes the villages of Hopewell, Britanniaville, Oakland, Whittenton, East Taunton and the Weir (which is the city's port), and covers an area of over forty-four square miles. The population in 1910 was 34,256; in 1916 it was 36,283 (Federal estimate).

Taunton Green, the town square, is in the heart of the business section. The more prominent buildings are the county courthouse, built at a cost of $300,000, the Federal building, Registry building, city hall, Y. M. C. A., Historical Hall and the Carnegie Library. The Morton Hospital, Old Ladies' Home and the State Insane Hospital are important institutions, and there are many old colonial buildings of historic interest. Taunton is an important industrial center. More than 2,500 people are employed in making cotton goods, and other important products are stoves, silverware, machinery, oilcloth and aluminum goods. The city has a large coastwise trade and during certain parts of the year is the headquarters of a considerable fishing business. The first crucibles for copper smelting cast in the United States were made here, and Taunton long supplied the government with copper disks for making one-cent pieces.

A settlement called Cohannet was founded on the site in 1638. Many of the settlers were from Taunton, in England, and the place was incorporated as a town under that name in 1639. It was chartered as a city in 1865. C.W.L.

TAURUS, *taw'rus,* THE BULL, the second sign of the zodiac, into which the sun enters about April 20. The symbol of this sign is ♉. The constellation Taurus contains altogether about 140 stars, and in the northern hemisphere is overhead in December and January. The most remarkable star is Aldebaran, a red star of the first magnitude, which is shown in illustrations as blazing in the head of the Bull. The V-shaped cluster of Hyades forms the face of the Bull, the Pleiades being also in this constellation. In the Pleiades are nearly 100 stars, but only six are visible to the naked eye, the brightest being called Alegone.

In Mythology. The Bull, according to legends, is the bull into which Jupiter transformed himself when he carried away Europa, who became mother of Minos and grandmother of



THE CONSTELLATION TAURUS
The sizes of the stars indicate their relative magnitude.

Deucalion, the Noah of the Deluge. In the ancient astronomy of India and Chaldea, the Bull also appears long before the Greek era. The Pleiades were the seven daughters of Atlas, all immortal except one, who gave up her immortality for love of a man, and whose brightness has vanished. The Hyades were half sisters of the Pleiades; by poets they are always called the "rainy Hyades." F.ST.A.

For additional illustration showing position in the heavens, see ASTRONOMY; for explanation of magnitude, see STAR, subhead *Magnitude.*

TAURUS, a mountain range or series of ranges, in Southern Asia Minor, extending along the Mediterranean coast from the Euphrates River in the direction of the Aegean Sea. The mountains form the southern boundary of the Anatolian Plateau, which occupies the central part of the peninsula of Asia Minor. Many peaks more than 10,000 feet in altitude rise in the Taurus ranges. An extension of the mountains on the northeast is known as the Anti-Taurus.

TAX AND TAXES. That portion of private wealth or income demanded by a government for the payment of its expenses is a *tax;* the money paid for such purposes is called *taxes.* Every nation or governmental unit must have

funds with which to meet its public expenses, such as the salaries of officers, the construction of public improvements, the support of the police and of the army and navy. In order to obtain such revenue, a certain percentage of the wealth of those who reside within the nation's boundaries is demanded by that nation. In other words, the money to conduct the government comes from the people.

Such a means of securing revenue has been employed from the earliest days of civilization. Many inscriptions testify that taxes were collected in Babylonia, Egypt and other countries of antiquity, while in both the Old and the New Testament there is frequent reference to taxgatherers, or "publicans." In Europe, during the Middle Ages, most governments were supported chiefly from the income of lands owned by the government (public or national domain) or by the ruler himself; there were some regular taxes and numerous special fees, but a state system of taxation was practically unknown. In the European cities of the period, however, local taxes were collected with considerable system and regularity, and in many of these centers only taxpayers were allowed the privileges of citizenship.

Kinds of Taxes. Taxes are of two kinds, *direct* and *indirect*. A direct tax is levied on the persons or the property upon which it is planned to rest, while an indirect tax is levied in such a way that its burden can be shifted or divided. In general, it is true that national governments are supported by indirect taxation, whereas local governments are maintained by direct taxation.

The simplest form of direct tax is a poll tax, literally a tax per head, each head, or person, limited to males of voting age, paying an equal amount. Formerly an important source of income, the poll tax has been generally abandoned. A more important form is the tax on real estate and on personal property; this tax, in various forms, is adopted to-day in all civilized countries. In former days, when property was less complex, the property tax was satisfactory; in a modern, more highly developed society, in which there is much property which can be hidden from taxing bodies, it has serious defects. It may allow huge amounts of property to escape taxation entirely—for example, stocks and bonds—and it does not divide equitably the burden of taxation. For this reason there have been numerous suggestions of substitutes, the most important being the single tax. There is also the income tax, which in theory is ideal, in that each person pays according to his ability. The difficulty of collecting income taxes, however, has greatly restricted their use. Much easier to collect is an inheritance tax, but not sufficient revenue could be derived from this source alone.

One of the chief troubles in adjusting a tax is the fact that it does not always fall on the persons who the government proposes shall pay it. Thus the owner of a house, if he lives in it, pays his own taxes, but if he leases his house to another he will add the taxes to the rent. Again, a cigar manufacturer must place a revenue stamp upon each box of cigars, but he carefully considers this tax before setting a price on his products. These taxes thus become *indirect*. The most important indirect taxes are customs duties and internal revenue taxes. These are the chief sources of the revenue of most nations.

Theory of Taxation. It is just that a citizen should pay some revenue to a government which protects him and guarantees that he shall live practically unmolested in the enjoyment of his talents and property. Until about 1850 economists generally assumed that taxation was the price of protection. This view meant that taxes should be apportioned according to the benefit received, or according to the expenses incurred by the state in creating conditions which yield this benefit. This theory was weak in that neither the benefit nor the expenses could be figured exactly. In actual practice, taxation is now based on the theory that each individual is under obligation to contribute in proportion to his means and ability. This is an obligation derived not from special benefits, but from the very fact of his existence as a member of a civilized state.

Economists add several other characteristics to taxation. A tax should be in proportion to the means of the taxpayer, but it should not be so heavy that it discourages initiative. For example, if every factory employing more than twenty men were taxed one-third of its annual income, the manufacturer would soon close his shop. A tax should not be so heavy that it amounts to confiscation, but under special circumstances it should permit of great expansion. In war times taxes might be doubled or trebled; under other conditions they might be reduced. A system of taxation should be flexible and accommodate itself to conditions from year to year, but this flexibility should not cause additional expense. It is right that a

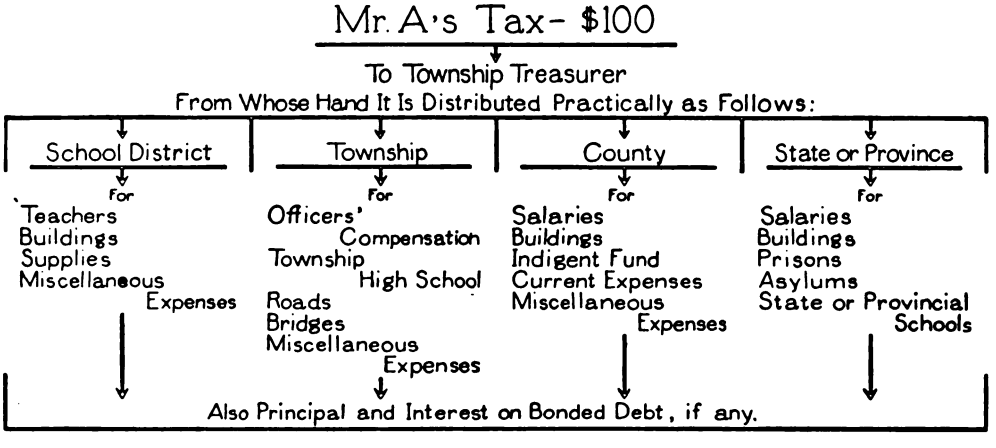
citizen should pay taxes, but the expense of operating the machinery of taxation should not add to his burden.

Taxation in Practice. *Local Taxation.* In the United States the state and its subdivisions raise money only by direct taxation. All of the states have a general property tax, some of them have inheritance taxes, others have income taxes, and a few still have the poll tax. Inheritance, income and poll taxes provide useful additions to the revenue of a state, but their uncertain character has so far prevented their adoption as the mainstay of a state system of taxation. In all the states the general tax on property is the chief source of income for all the units of government.

Before any money can be raised by property taxes, two fundamental questions must be answered—first, what is the value of the taxable property, and second, how much money is needed. The first question is answered by the assessors. Every owner of real or personal property is required by statute to file with the assessors a statement of his property together with its "fair cash value." On the basis of these schedules and on the results of their own investigations, the board of assessors fixes the amount on which the owner is taxed. If the owner feels that the assessed valuation is too high he may ask the board of review to reduce it.

The second question is not answered so easily, because the tax paid by an owner, whom we may call Mr. A, is distributed among several governmental units approximately as indicated in the diagram below.

The most important man in this system is the township treasurer; (in some states, however, the taxes are paid to the county collector or treasurer). All taxes are paid first to him, and are properly distributed by him. The taxpayers of a township must first pay the expenses of their township. But each township, being a part of the county, bears its share of the expenses of county government. The state, too, calls on each county for its share of the funds which shall maintain the state government. The amount of money which each unit is required to pay to the next higher unit is determined by the county board and state board of equalization in proportion to the taxable property in each unit. Thus the state is really supported by the counties, which are supported in turn by the townships. It must be remembered, however, that the county and the township are created by the state; they tax in their own name, but they derive their authority from the state. The total amount needed for all purposes, divided by the assessed value of the property in the state, determines the tax rate; for example, if $1,000,000 is needed for all expenses, and if the value of all property is $200,000,000, the tax rate is $\frac{1,000,000}{\$200,000,000}$ or $\frac{1}{200}$, or one-half of 1 per cent. Standing somewhat aside from these other units is the school district, which is a division of the township or county for school purposes; in practically all states the voters in a school district pay special taxes to support the schools in that district.



The Canadian tax system shows one important difference from that of the United States. In the latter the individual state receives most of its income from a direct property tax; in Canada the province, which is the corresponding division, levies no general property tax, but receives most of its income in the form of a subsidy from the Dominion government. As

in the states, the provinces levy special taxes, such as those on incomes and inheritances, and also derive some revenue from royalties and special license fees of various kinds. All local or direct taxes, however, are levied by and for the local units. The list or "roll" of the assessors gives the value of all the taxable real and personal property. The municipal council levies a tax on this property sufficient to pay the debts and expenses of the government. In case a taxpayer feels that he is assessed or "rated" too high, he may appeal for a reduction to a court of revision, usually composed of members of the local council, and finally to the regular courts of the province.

National Taxation. In Canada the Dominion government levies no direct taxes, and in the United States only the income tax is a national direct tax, and that only since 1913. Both Canada and the United States derive most of their revenue from customs duties and internal revenue. In a technical sense the United States income tax is a direct tax, but it falls on such a small part of the people that it still remains true that both national governments are supported by indirect taxation. Some idea of the importance of trade and commerce may be gained from the fact that the United States government derives one-third of its income from customs dues and one-third from internal revenue, and the Dominion government receives two-thirds of its total income from customs duties alone. If the customs duties, for any reason, should be greatly lessened or totally disappear, radical changes in the system of taxation would be inevitable. W.F.Z.

Consult Adams' *Public Finance;* Daniel's *Elements of Public Finance;* Judson's *The Taxing Power.*

Related Subjects. In connection with this discussion of taxes the reader may consult the following articles in these volumes:

Assessor	Internal Revenue
Customs Duties	Poll Tax
Free Trade	Single Tax
Income Tax	Tariff
Inheritance Tax	

The Mathematics of Taxes

The amount of tax levied by the government depends upon the expenses it must meet. The *rate* of tax depends upon the expenses to be met and the value of the property to be taxed. For example, the town of D has taxable property assessed to $10,000,000, and the tax to be raised is $275,000. The rate of tax is 2¾% or 2¾ cents on the dollar, or 27½ mills on the dollar. The rate is the relation of the tax to the assessed value of the property, as shown below:

$$\text{Rate} = \frac{275\cancel{000.00}}{10000\cancel{000}} = \frac{275}{10000} = 2\tfrac{3}{4}\%$$

$$\text{Tax on } \$1 = \frac{\$275000.00}{10000000} = \$.02\tfrac{3}{4}$$

In the town of D a person owning property assessed at $16,500 will pay in taxes .02¾ of $16,500 or $453.75.

Problems. 1. There is to be raised in a certain town for a new school a tax of $8000; the assessed valuation of property is $400,000. What is the rate of taxation? What is the tax of Mr. James, who owns property assessed at $1,350?

Solution:

Tax = $8000

Assessed valuation = $400000

$$\text{Rate of tax} = \frac{\overset{2}{\cancel{8000}}}{\underset{100}{\cancel{400000}}} = 2\%$$

Mr. J's tax = .02 of $1350 = $27

2. In a certain large city the tax needed was as follows: for the state $1,300,150, for the county $1,800,000, for the city $5,478,300, for the schools $6,000,000, for the parks $1,500,800. The city property was valued in full at $1,286,340,000. Property was taxed on ⅕ of full value. What was the rate of taxation? What was the tax of Mr. N, who had property valued at $7500, full value?

Solution:

State tax	$ 1,300,150
County tax	1,800,000
City tax	5,478,300
School tax	6,000,000
Park tax	1,500,800
Total	$16,079,250

$$\text{Assessed property value} = \frac{\$1,286,340,000}{5} = \$257,268,000$$

$$\text{Rate} = \frac{\$16,079,250.00}{\$275,268,000} = .06\tfrac{1}{4}$$

$$\text{Assessed value of Mr. N's property} = \frac{\$7500}{\$5} = \$1500$$

Mr. N's tax = .06¼ of $1500 = $93.75

3. In the town of E a tax of $20,000 is needed; there are 380 polls, each paying $2. How large a property tax must be raised? Ans. $19,240.

4. If the rate of tax is $13 on every thousand dollars' valuation, what is the tax of a person owning property valued at $7000?

5. At $1.75 on $100, what is the rate of tax in per cent? What is the tax on property assessed at $8000? Ans. 1¾%; $140.

6. The rate of state tax is 1 mill, of county tax 3½ mills, of town tax 4 mills. What is the tax of a property owner in that town on property assessed at $8000?

Solution:
Rate = .008½
Tax = .008½ × $8000 = $68

Problems Involving Duties. 1. What is the duty on a shipment of perfumery bought in Paris for $420, weighing 125 pounds, ad valorem duty 50% and specific duty $.60 per pound?

Solution:
Invoice price = $420
Ad valorem duty = .50 × $420 = $210
Specific duty = 125 × $.60 = $ 75
Total duty = $285

2. The duty on canned fish is 30%. What is the cost to the merchant of importing a lot of sardines costing $625 in Italy?

Invoice price = $625.00
Ad valorem duty = .30 × $625 = 187.50
Total cost = $812.50

3. The ad valorem duty on a shipment of gloves at 60% was $172.50. What was the invoice price of the lot?

Ad valorem = $172.50
Rate = 60%
$172.50 = .60 × invoice price
Invoice price = $\frac{\$172.50}{.60} = \$287.50$

SUGGESTIONS AS TO TEACHING THE SUBJECT. (a) Students should get a good knowledge of relations of people and government, needs of the government, public obligations, etc.

(b) They should find out the many needs for money in their own school district, village, city and so on.

(c) They should see how the assessor, collector and treasurer get office, etc.

(d) They should discuss the rate of tax in their own locality.

(e) They should know something of the tariff system historically.

(f) They should know that the invoice price of imported goods is found in the manifesto from the office of the American consul at the foreign city from which the imported goods are shipped to this country.

(g) In general, students should have an intelligent grasp of the *civil, social and industrial conditions that give rise to tax problems.* American tariff schedules can be secured by writing to the Department of the Treasury at Washington. Students should obtain these. A.H.

TAXICAB, *tak'si kab,* a public motor vehicle used chiefly in cities to carry passengers for hire. It is an example of specialization in automobile making, and is rapidly taking the place of the cab or coach drawn by horses. High-grade taxicabs are fitted with all possible comforts for the passengers, such as drop seats for children, side pockets for papers and programs, opera glass and cigar holders and electric lights. These vehicles are equipped with *taximeters,* automatic devices which register the mileage covered and record the amount of the fare. Rates are fixed by city ordinances, and fares are collected on the basis of the distance covered or according to the time consumed. There are other regulations as to number of passengers, seating capacity of vehicle, time used in waiting for passengers, time lost because of breakdowns, etc.

AN EARLY TAXICAB

A Chinese public conveyance, three centuries old. It was provided with a mechanical register in the form of a drum, which was beaten by a hammer at the end of each mile.

Generally speaking, rates in Europe are lower than in the United States. In the latter country the city of Chicago taxicab service offers the lowest rates. One company carries one passenger one-half mile for twenty cents, with a further fee of five cents for each added quarter mile. Only ten cents each is charged for each additional passenger for the full trip.

TAXIDERMY, *tak'si der mi.* The visitor in a zoölogical museum is usually impressed by the natural appearance of the mounted animals exhibited. Often these are shown much as they lived in their native haunts, that is, in a picturesque setting of woods or water. Birds, fish, squirrels and larger woodland mammals, and wild beasts of the jungle, even elephants, are exhibited in a most realistic manner. The science by which animals are thus preserved and represented is known as *taxidermy,* a term derived from two Greek words meaning *arrangement* and *skin.*

As taught at the present time, taxidermy is a complicated art which compels one who would master it to acquire a considerable knowledge of anatomy, natural history, drawing, carving, sculpture, mechanics, tanning and dyeing. As a preliminary step the student

must have a thorough understanding of animal forms and expressions, and such knowledge is gained through lessons in drawing and modeling, through the detailed study of casts and portions of dead animals and the study of live specimens. Ward's Natural Science Institute, at Rochester, N. Y., is the most famous taxidermic school in the United States, and most of the American museum experts have been graduated from this establishment. An excellent taxidermic department is also maintained by the United States National Museum, at Washington.

The complete process of mounting is about as follows: By means of a special method of cutting, the skin is removed from the body, even to the ends of the toes and the tips of the ears. This stripping is done so skilfully that there is no injury or disfigurement of the fur, hair, feathers or scales, as the case may be. After the skin is removed it is treated with some preservative compound, such as arsenical soap. When mammals are mounted accurate measurements of the skin are made, and a drawing is worked out which shows the location of muscles, ribs and hollows. This copy is used as a guide. Next a manikin corresponding to the body of the animal is constructed by covering a framework of wire and excelsior with clay, plaster or papier-mâché. The modeling of such a figure must be done as carefully as if it were intended to be a sculptor's model. Finally, the skin is put on the manikin, and is carefully sewed together at the points where slits were made in stripping it from the body.

The details as to shaping the ears, putting in the eyes, tongue, lips, etc., and otherwise accurately reproducing the animal are numerous and complicated. Glass eyes are no longer used; they have been replaced by hollow globes painted so as to give a natural expression. There are special processes for the mounting of birds, fishes and reptiles, but these follow in general the methods given above. M.R.T.

Consult Hornaday's *Taxidermy and Zoölogical Collecting;* Rowley's *The Art of Taxidermy.*

TAY, *ta,* the longest river of Scotland, with a length of 118 miles, that carries more water to the sea than any other stream in Great Britain. It rises in Ben Lui, a mountain on the boundary between Perthshire and Argyllshire, flows through Loch Tay, passes Dunkeld, Aberfeldy, Perth and Dundee, and enters the North Sea through the broad estuary known as the Firth of Tay. The principal tributaries on the right are the Almond, Earn and Bran; those on the left are the Lyon, Isla and Tummel. In portions of the river dangerous floods have occurred at various times. Navigation is seriously obstructed by shifting sandbanks and swift currents, but the river is navigable to Perth for small vessels, and the largest ships reach Dundee at all stages of the tide. An iron railroad bridge over two miles long spans the estuary. The Tay is one of the most beautiful of Scotland's many picturesque rivers, and it also enjoys great repute as a salmon stream; at Hormontfield, near Perth, there is a hatchery for the breeding of these fish.

TAYLOR, [James] Bayard (1825-1878), an American poet, essayist and traveler, born at Kennett Square, Pa., of Quaker ancestors. He received only a high school education and began life as a printer. When but twenty years old he made a visit to Europe, in the course of which he tramped from place to place and supported himself by writing letters, which were afterward published in book form under the title *Views Afoot.* He was a born traveler, and journeyed in his later years in Asia Minor, Egypt, China, Japan and various countries of Europe, and wrote many volumes descriptive of the scenes and peoples he visited. During the War of Secession he was secretary to the legation at Saint Petersburg, and in 1878 he became United States minister to Germany. He died in Berlin.

BAYARD TAYLOR

Taylor's most famous work is his translation of Goethe's *Faust,* which is probably the best in the English language. It was, however, his travel volumes which won him widest reputation during his life and for which he is most generally remembered. His own great ambition was to be known as a poet; but while his works all show poetic talent, and some of them, as the *Bedouin Love Song,* have retained their popularity, they lack the indescribable quality that would make them really great. Among his works are *El Dorado,* a description of California in the days of gold seeking; *By-Ways of*

Europe; A Visit to India, China and Japan; four novels, of which *Hannah Thurston* is the best; and the volumes of poems: *A Book of Romances, Lyrics and Songs; Poems of the Orient; Lars, a Pastoral of Norway; The National Ode,* and *Prince Deucalion.*

TAYLOR, JEREMY (1613-1667), an English preacher and author, born at Cambridge and educated at Caius College. Gaining the favorable notice of Laud, he was accorded a fellowship at All Souls', Oxford, and was made chaplain to Charles I, to whose cause he remained loyal throughout all the years of the civil war, which ended in the execution of the king in 1649.

Before the outbreak of the struggle he had been appointed rector of Uppingham, but he lost that post, and during the early part of the war was in the royal army as chaplain. For a time he was imprisoned in Wales and after his release remained in that country, teaching school and writing. It was here that his most famous works were produced: *The Liberty of Prophesying,* the *Life of Christ, Holy Living* and *Holy Dying.* At the Restoration he was made bishop of Down and Connor, in Ireland, and notwithstanding his position there was rendered unpleasant he remained, faithful to his duties, until his death. His works, especially his sermons and his *Holy Living* and *Holy Dying,* are models of eloquence, and they abound in poetic imagery and evidences of a rich and fertile imagination. *Holy Living* and *Holy Dying* remain popular.

THE STORY OF ZACHARY TAYLOR

TAYLOR, ZACHARY (1784-1850), an American soldier and statesman, twelfth President of the United States. Taylor was the second President to die in office, William Henry Harrison being the first, only nine years earlier. His untimely death, coming only sixteen months after his inauguration, cut off his political career at its very beginning, for he had held no political office of any kind previous to the Presidency. He was a soldier for forty years, and it was his reputation as the hero of the Mexican War that was the decisive factor in making him President. Without political training, he saved himself through his courage, his conscientiousness and his good judgment. These carried him through difficulties in which the training of the politician would have been worthless. Conscious of his inexperience, he relied on the advice of others, but his judgment kept him steady amid confusing, conflicting channels. Had he lived to serve out his term the soldier would almost surely have proved himself a statesman of a high order.

Zachary Taylor was born in Orange County, Virginia, on September 24, 1784. He was the third son of Colonel Richard Taylor, a Revolutionary officer. At the close of the war, Colonel Taylor retired to his Orange County plantation, but in 1785 he removed to Kentucky, which was then part of Virginia, and took up a farm near the present city of Louisville. Of formal schooling young Zachary had none. The new settlement offered few opportunities for scholastic training, but it did teach thrift, industry and self-denial. It also taught many things about war and military life, for many of Colonel Taylor's neighbors were Revolutionary soldiers who had received grants of land from Virginia. Before the colonel's wide hearth were told stories of the dark days of the Revolution and reminiscences of brave deeds. Undoubtedly this military past had its influence on the Taylor boys, for all but one of the five joined the army.

Early Career in the Army. During young Zachary's early manhood the United States became involved in disputes with France and Great Britain over the rights of neutral commerce and other matters affected by the Napoleonic Wars. In 1808 the status of these disputes seemed to point to immediate war with Great Britain. Congress authorized an increase in the size of the army, and of one of the new regiments, the Seventh Infantry, Zachary Taylor was appointed first lieutenant. Two years later he was promoted to the rank

of captain, and about the same time was married to Miss Margaret Smith, the daughter of a Maryland planter.

In June, 1812, war was declared against England. This action made it almost certain that the Indians allied with the British would begin raids. One of the points of attack would be Vincennes, on the Wabash River. To protect Vincennes from a surprise attack, Captain Taylor with his company of fifty men was ordered to Fort Harrison, a stockade on the river above Vincennes. Here the little force was attacked by a large band of Indians, led by Tecumseh; it was beaten off so effectively that for months afterward no Indians could be found in this section. For the defense of the fort Captain Taylor received the brevet rank of major, which was later confirmed by commission. Major Taylor was in active service against the Indians in the Wabash and Rock River valleys until the close of the war.

Indian Campaigns. At the close of hostilities, because of changes in the army organization, Taylor was reduced to the rank of captain. Regarding this as an injustice, he resigned his commission and returned home. Some influence, not stimulated by himself, secured his restoration to the rank of major. As lieutenant-colonel he later commanded at Fort Snelling, then the border post of the Northwest, and as colonel was in charge of Fort Crawford, at Prairie du Chien (Wisconsin) when the Black Hawk War began. Colonel Taylor served through the campaign, and himself received the surrender of Black Hawk. Four years later, in 1836, he was sent to hold a command in Florida, and in 1837 defeated the Seminole Indians in the decisive Battle of Okechobee, a victory for which he received the brevet rank of brigadier-general. In 1838 he assumed chief command in Florida, and in 1840 was assigned to command the southern division of the western department of the United States army.

In the Mexican War. As the commander in this division, he was naturally given the task in 1845 of defending Texas from the threatened invasion by the Mexicans. Texas had entered the Union, so it said, with the Rio Grande as its boundary; it asked protection for this frontier, and General Taylor was to advance to that river. Collecting a force of about 4,000 men, both regulars and volunteers, at Corpus Christi, he advanced to the Rio Grande, and halted on its bank, opposite Matamoras. There the Americans built Fort Brown. General Ampudia, the Mexican commander, demanded that the Americans retire beyond the Nueces River, which they claimed as a boundary. Taylor promptly refused. In order to obtain more supplies, Taylor took half of his force to Point Isabel, his base, thirty miles away. On the second day of the return trip a force of 6,000 Mexicans opposed the further progress of his troops. Most of the officers were in favor of falling back to Point Isabel, to await reënforcements, but Taylor, after listening to the arguments, said: "I shall go to Fort Brown or stay in my shoes," a Western expression equivalent to "die with my boots on." Although out-

ZACHARY TAYLOR

One of those numerous Americans who were made national heroes by war and afterwards raised to high civil office.

numbered three to one, the Americans attacked early on the morning of May 8, 1845, and in the battles of Palo Alto and Resaca de la Palma routed the Mexicans, who fled across the Rio Grande and left open the way to Fort Brown. On May 18 General Taylor's force occupied Matamoras.

In the meantime, on May 13, war had been formally declared. General Taylor then prepared to advance into Mexico, as the Rio Grande was an unsatisfactory strategic boundary. With 6,625 men he marched against Monterey, which surrendered on September 24 after a three days' bombardment. By the terms of surrender the Mexicans agreed to retire behind a certain line, and the American troops agreed not to advance beyond it for eight weeks. This armistice was not approved by the United States government. Assuming, therefore, that

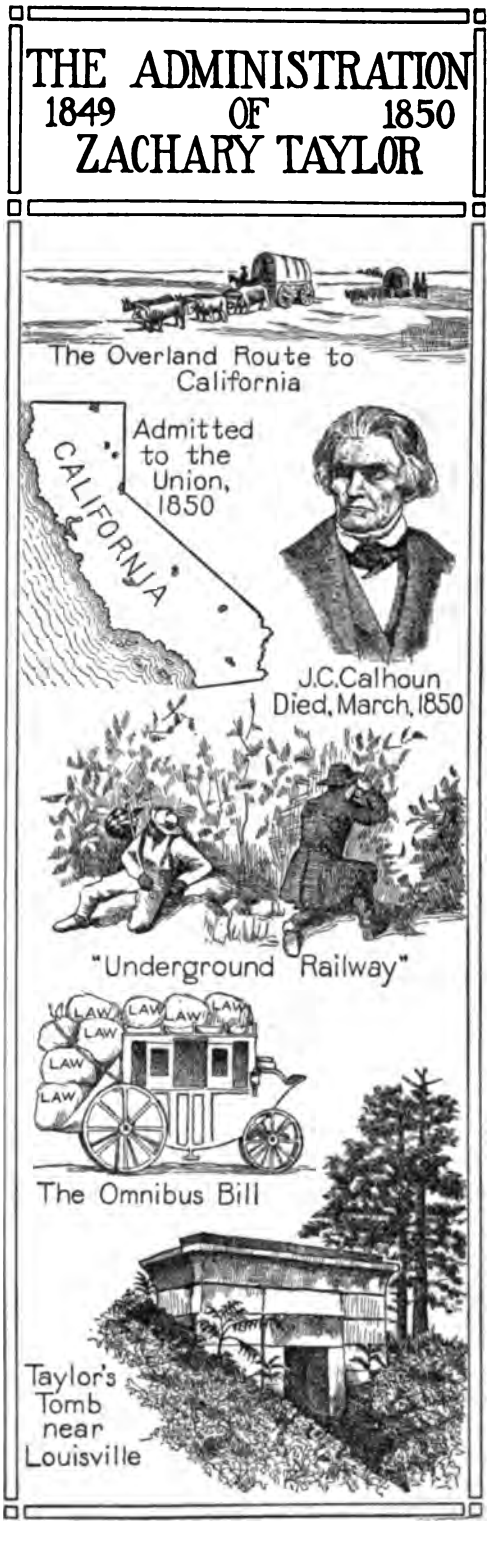
the government was planning a further invasion of Mexico, General Taylor made preparations to that end, and was all but ready to advance, when he learned that General Scott had arrived at Vera Cruz with orders to take such troops and supplies as he needed from Taylor's army. This was in the spring of 1847. Scott left Taylor only 5,000 unseasoned troops to oppose General Santa Anna's army of 20,000. Santa Anna saw his opportunity, advanced to the attack, and met Taylor at Buena Vista, to which the Americans had withdrawn. There General Taylor's army won a brilliant victory over a vastly superior force, a victory which aroused great enthusiasm and made Taylor a national hero.

As a soldier, General Taylor ranks high. In the words of one who knew him well and understood him thoroughly:

> Unpretending, meditative, observant and conclusive, he was best understood and most appreciated by those who had known him long and intimately. In a campaign he gathered information from all who approached him, however sinister their motive might be. By comparison and elimination he gained a knowledge that was often surprising as to the position and designs of the enemy. In battle he was vigilantly active, though quiet in bearing; calm and considerate, though stern and inflexible; but when the excitement of danger and strife had subsided, he had a father's tenderness for the wounded, and none more sincerely mourned for those who had bravely fallen in the line of their duty.

When the Mexican War was over it seemed to General Taylor that the time had come to realize his dream of living again on a farm. In 1842, when he took command of the Southern division, he purchased a plantation near Baton Rouge, La., and later he planned to conduct a stock farm in the hills of Jefferson County. He had never felt any longing for political life, and he was always waiting for the day to come when he should be free to manage his private affairs. But his dream was not to be realized. His military career had made him a hero—"Old Rough and Ready," he was called. His popularity was seized by the Whigs to help preserve the party. As the Presidential campaign of 1848 approached the Whigs had three possible candidates—Clay, Scott, and Taylor. Clay was still the party leader, but he had already been defeated three times. Scott had been a Presidential possibility for a quarter of a century, and there were good arguments against him.

There remained Taylor, who easily outshone Scott as the popular hero of the war. He was not the fittest candidate the Whigs might have

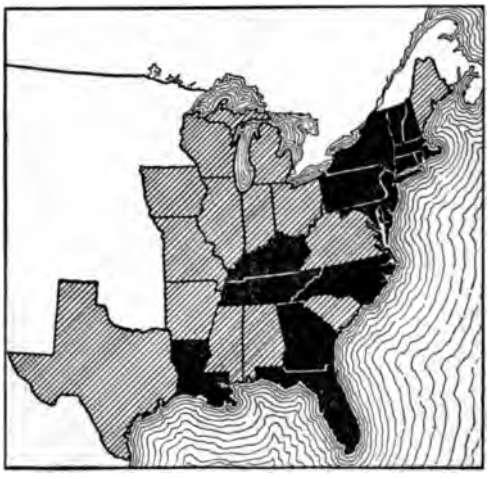


chosen, but he was the strongest. With him as its candidate the Whigs won their second and last victory in a Presidential election. Taylor received 163 electoral votes to 127 votes for Lewis Cass, the Democratic candidate. The popular vote was close: 1,360,101 for Taylor to 1,220,544 for Cass. Van Buren, the Free-Soil candidate, received 291,263 popular votes, but no electoral votes. The campaign was fought without much enthusiasm, and practically without an issue. Neither of the two great parties made an effort to rally the people to the defense of any important principle. As one historian remarks, somewhat sarcastically, practically the only thing it decided was that a Whig general should be made President because he had done effective work in carrying on a Democratic war.

The Administration of Zachary Taylor

As President, Taylor had no friends to reward and no enemies to punish. He chose for his Cabinet men of national reputation, not one of whom was personally known to him. All the members of his Cabinet were lawyers, and all had served either in the Senate or in the House of Representatives. John M. Clayton, of Delaware, as Secretary of State, and Reverdy Johnson, of Maryland, as Attorney-General, were the best known of the group.

Clayton-Bulwer Treaty. The settlement of the Oregon question and the acquisition of



ELECTION MAP OF 1848

States in black gave their electoral votes to Lewis Cass, Democrat; shaded states voted for Taylor, Whig. White area south of Canada and north of Mexico was unorganized territory.

California naturally gave a new importance to the old plan of a water route across the Isthmus of Panama. In 1849 Nicaragua granted to a company of United States capitalists a concession for an isthmian canal, on condition that the United States should guarantee the neutrality of the canal and also the sovereignty of Nicaragua over the territory along its course. Then, in order to forestall British interference, the United States obtained the cession of the island of Tigre, in the Gulf of Fonseca, on the Pacific side from Honduras. This gulf was the probable Pacific outlet of the canal, but Great Britain already controlled the Atlantic end.

This complication made necessary a readjustment of the Anglo-American relations, and resulted in the Clayton-Bulwer treaty of 1850. The treaty was signed on April 18, and was ratified on July 5. By this agreement the two nations agreed to promote a canal across Nicaragua, and that neither would "ever obtain or maintain for itself any exclusive control over the said ship canal" or "assume or exercise any dominion . . . over any part of Central America." The "neutrality and security" of the canal was guaranteed so long as there should be no "unfair discriminations" or "oppressive exactions" in its management.

The Compromise of 1850. One of President Taylor's first acts was to send agents to California and New Mexico with instructions to urge the people of those territories to frame constitutions and apply for admission to the Union as states. But before the agents reached their destination, events had already moved in the desired direction. A convention was held in California in September, 1849, and a constitution was adopted which prohibited slavery. In Taylor's annual message, sent to Congress in December, there was reference to this movement in California to organize a state government, and to the prospect of similar action in New Mexico.

The first session of the Thirty-First Congress, in December, 1849, was remarkable for a fierce struggle over the Speakership, the difficulty lying in the fact that a small group of Free-Soilers held the balance of power and refused to vote either for the Whig or the Democratic candidate. In the course of this contest the fiercest sectional antagonisms were stirred up, and conservative men everywhere were becoming alarmed for the safety of the Union. It was then that Robert Toombs of Georgia said:

OUTLINE AND QUESTIONS ON ZACHARY TAYLOR

Outline

I. Early Years

(1) Birth and parentage
(2) Lack of education
(3) Effect of "war stories" in determining choice of vocation

II. Military Career

(1) Appointment as first lieutenant
(2) War of 1812
  (a) Defense of Vincennes
  (b) Made major by brevet
(3) Indian warfare
  (a) Reduction and re-promotion
  (b) Black Hawk War
  (c) War against Seminoles
(4) The Mexican War
  (a) Assigned defense of Texas
  (b) Encampment on Rio Grande
  (c) Battles of Palo Alto and Resaca de la Palma
    (1) Superior Mexican forces
  (d) Occupation of Matamoras
  (e) Capture of Monterey
  (f) Coming of General Scott
  (g) Battle of Buena Vista
    (1) Superior Mexican force
  (h) Victories factor in determining future career

III. Election of 1848

(1) Possible Whig candidates
  (a) Reason for choice of Taylor
(2) Absence of sharp campaign
(3) Victory of Taylor

IV. Administration

(1) Choice of Cabinet
(2) Treaty with Nicaragua
(3) The Clayton-Bulwer Treaty
  (a) "Neutrality and security" of isthmian canal guaranteed
(4) Compromise of 1850
  (a) Rising public sentiment
  (b) Great speeches on the question
  (c) Terms of Compromise
    (1) California admitted as free state
    (2) New Mexico and Utah organized as territories
    (3) Slave trade suppressed in District of Columbia
    (4) Fugitive Slave Law enforced
  (d) Immediate results
  (e) Later effects
(5) Death of President

V. Summary

(1) Character of Taylor
(2) Rank as soldier
(3) Political possibilities

Questions

What does the expression "stay in my shoes" mean and under what circumstances did Taylor make use of it?

Quote from a speech which indicates clearly the degree to which a feeling of animosity between North and South on the slavery question had increased.

How did Taylor's rise to the Presidency resemble that of Grant? How did it differ from that of Harrison?

What connection did the head of the Confederacy have with Zachary Taylor?

What statesman during this administration wrote a great speech but was too weak to deliver it?

What was the occasion of this speech, and what other famous statesmen took part in the controversy?

With what famous Indian chief did Taylor come into conflict?

What battle really won for Taylor the Presidency, and what were the circumstances that made this battle such a triumph?

What was Taylor's popular nickname?

How did a treaty with Nicaragua make necessary a treaty with Great Britain, and what were its terms?

I do not hesitate to avow before this House and the country, and in the presence of the living God, that if by your legislation you seek to drive us from the territories of California and New Mexico, purchased by the common blood and treasure of the whole people, and to abolish slavery in this district, thereby attempting to fix a national degradation upon half the states of this Confederacy, I am for disunion.

In this grave crisis Henry Clay appeared in the Senate for the last magnificent effort of his career. On January 29, 1850, he introduced into the Senate eight resolutions, which, with some amendments, stand in history as the Compromise of 1850. Clay's great speech in support of the resolution was made on February 5 and 6. Calhoun's reply came on March 4. It was read by Senator James Murray Mason of Virginia, for Calhoun was at the grave's edge and too weak to deliver it, but the veteran sat bravely in his seat. It was Calhoun's last public work; he died on March 31. Three days after Calhoun's speech, Webster delivered the Seventh of March speech, and in later weeks William H. Seward and Salmon P. Chase, newcomers in the Senate, were heard.

In April the resolutions were referred to a committee of which Clay was chairman, and on May 8 the committee reported two bills which would accomplish all that Clay wanted. One of these measures, the "Omnibus Bill," provided for the admission of California, for the organization of New Mexico and Utah as territories, for a Texas boundary which would exclude any territory claimed by that state in New Mexico. The second bill provided for the suppression of the slave trade in the District of Columbia and for a more effective enforcement of the Fugitive Slave Law. Before much progress was made with these bills, Taylor died suddenly, on July 9, 1850, after an illness of four days. His remains were placed in the family cemetery near Louisville, Ky.

The two bills as drafted by Clay met little favor in Congress, but their substance was finally recognized as the necessary compromise. Special bills on each feature of the compromise were passed, in most cases by a large majority. Thus the final decision was postponed for another decade, when the fires which had flamed fitfully from time to time became a steady blaze. In that greater conflict President Taylor's only son, Richard (1826-1879), played a conspicuous part as a Confederate general. His son-in-law, the husband of Sarah Taylor, was Jefferson Davis.

Consult O. O. Howard's *Zachary Taylor.*

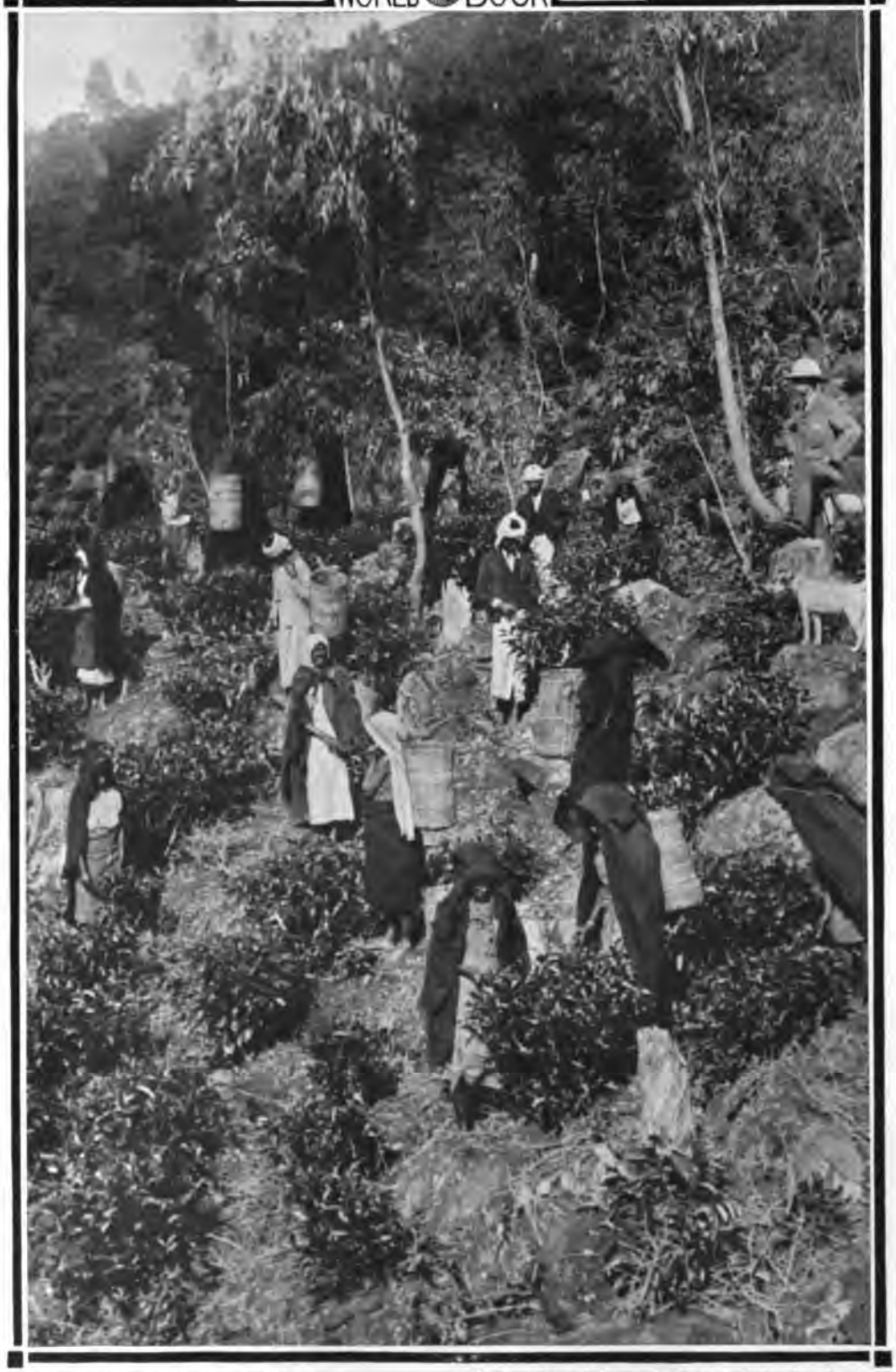
TAYLOR, PA., a borough in Lackawanna County, in the northeastern part of the state, four miles southwest of Scranton. The Central of New Jersey and the Delaware, Lackawanna & Western railways provide railway transportation, and interurban lines operate in all directions from the city. Taylor is located in the Lackawanna Valley, famous for its yield of anthracite coal, and the mining and shipping of this product is the chief industry. The manufacture of silk is also important. In 1910 the population was 9,060; in 1916 this had increased to 12,077 (Federal estimate).

TCHAD, *chahd,* **LAKE,** another and more ancient spelling for CHAD, an African lake in the Sahara region, under which title a description is given.

TEA, a beverage brewed from the leaves of an Oriental evergreen tree, in popularity yielding only to coffee among unfermented drinks. Millions of people in all parts of the world use it daily, and it can almost be called the national beverage of Japan, of China and of England. For centuries it has been the custom of the English to stop all business in the middle of the afternoon while every one partakes of a social cup of tea, but it is said that this delightful custom was discontinued during the War of the Nations. When Japan and Russia contended for supremacy in Asia, in 1904-1905, the Japanese effectually warded off disease by drinking tea instead of water, for on the battle field it is difficult to obtain the latter in a pure condition. Tea, on the other hand, is a sterilized drink. In Japan itself social tea drinking is a ceremony having definite rules of etiquette.

Tea is associated with much that is delightful in life, but, like many other good things, it should be enjoyed in moderation. Its two principal constituents are caffeine and tannin. The former is mildly stimulating in small amounts, but produces injurious effects on the nervous system when taken in large quantities (see CAFFEINE). Tannin is a poisonous principle, and it is not soluble in water except when boiling is carried on for a long time. If one pours boiling water on the leaves and then pours out the tea as soon as it has acquired the desired strength and flavor, the beverage will not have the bitter taste that reveals the presence of tannin. When tea is properly made and is not drunk to excess it is harmless for most people.

The Tea Plant. Under cultivation, the tea plant, which belongs to the same family as the camellia, is a branching shrub from two to six



IN SOUTHERN INDIA.

Native tea pickers. They work twelve hours every day and receive about fifteen cents each.

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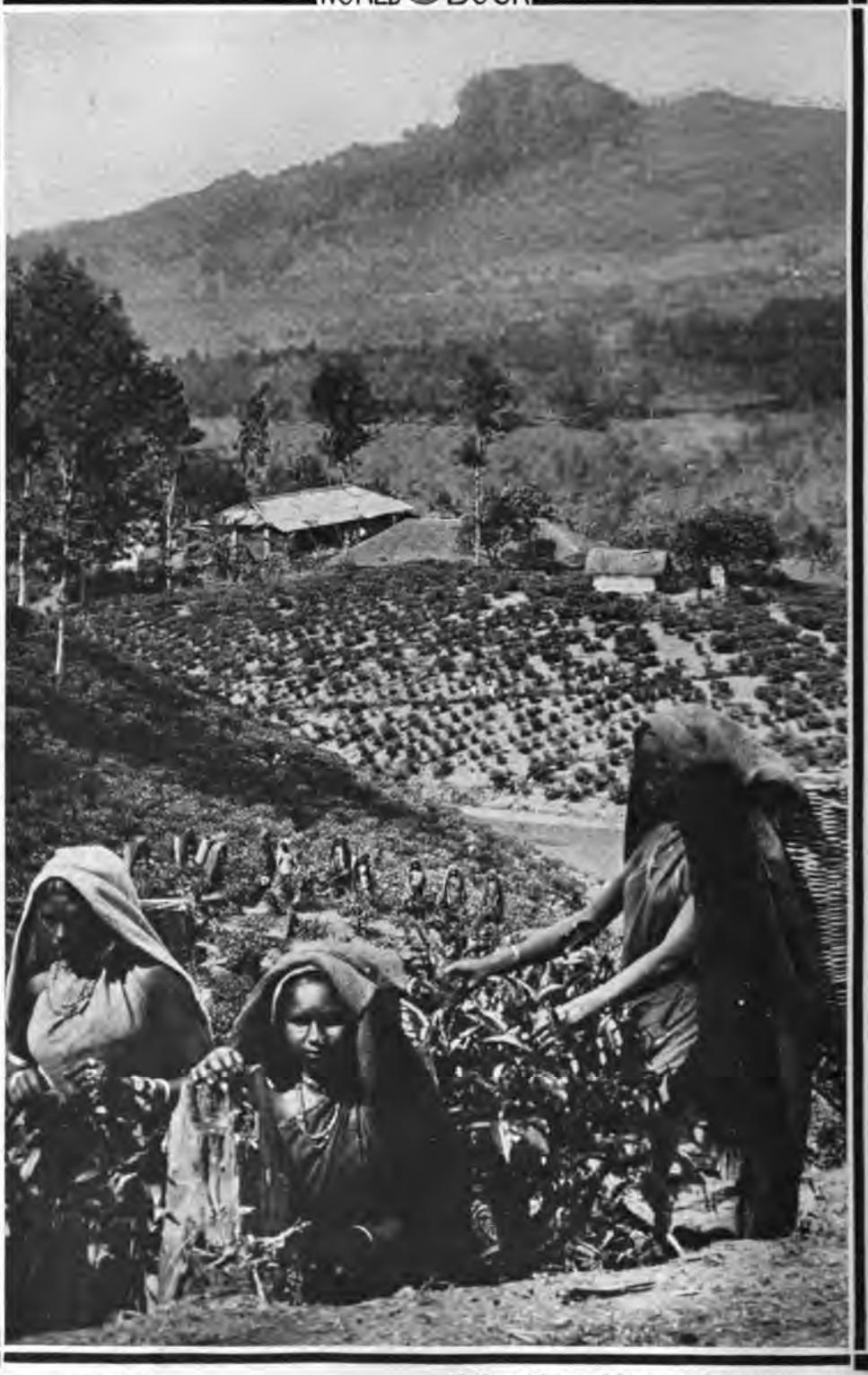

IN CEYLON.

Native girl tea pickers, on the largest ranch in the island, owned by Sir Thomas Lipton.

IN FORMOSA.

Weighing tea, preparatory to putting it in cases. Packing for shipment to America.

PICKING TEA IN JAPAN.

This scene of rare beauty does not suggest poverty, but some of the pickers are so poor they cannot afford to drink tea, except such as is brewed from rejected and nearly worthless leaves.

Drying and sorting tea leaves for the American trade. Practically all of the tea grown in Formosa is sent to the United States.

IN THE ISLAND OF FORMOSA.

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Native girls resting at noon from their tea picking. The stately trees are beautiful areca palms.

IN INDIA.

IN JAPAN.

Noon in the tea field. Tea served under the cherry blossoms. Below: The ceremonial tea, a national institution.

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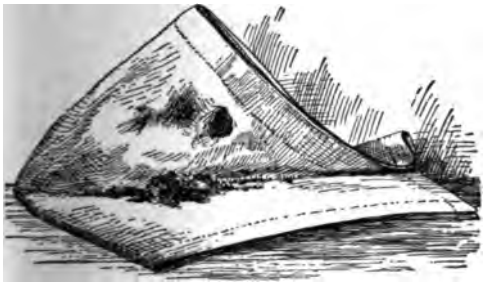
HARD WORK IN CHINA. This boy of twelve years carries eighty pounds of tea 400 miles to market and gets back home in twenty days. The father's pack weighs 350 pounds.

feet in height. On tea plantations it is kept to a small size by constant pruning, for the purpose of increasing the number of leaves, but in its natural state it grows as a tree thirty feet or more in height. The gardens or estates are planted to small bushes four or five inches high, which have been grown from seeds in nurseries. The small plants are set close together in rows, sometimes as many as 1,500 to the acre. At the end of three years a bush begins to be commercially profitable, but does not produce a full crop for at least two years more.

The chief tea-growing countries are Japan, including the island of Formosa, China, Ceylon, India and Java; a small amount of tea is raised in South Carolina. An abundance of rainfall and a hot climate are especially favorable to the production of this plant. In Japan and China the plants are grown in comparatively-small gardens, but in Java, Ceylon and India there are vast estates, some of which produce more than a million pounds of tea a year. A field in full blossom is a charming sight, for the rose-colored or cream-white flowers are very lovely against the background of green stems and thick foliage. The leaves of the plant are long and leathery, somewhat resembling those of the willow tree. The finest quality of tea is yielded by the young, tender leaves, while the older and coarser ones are utilised for cheap brands.

Preparation for the Market. The first step in the manufacture of tea is the picking of the leaves. This is done entirely by hand, and it is



TESTING TEA FOR PURITY

One of the most common adulterations of tea is the dyeing of the leaves to give them a good color. The fraud is not hard to detect. Place dry tea leaves between the folds of a clean, white cloth, and rub the folds together. If the tea is pure and has not been treated, no marks will appear on the cloth; dye stains will soil the cloth and be difficult to remove.

a work in which men, women and children engage. The leaves are dropped into baskets suspended from the shoulders of the workers, and as the baskets are filled the leaves are taken to the factory for curing. It is a somewhat prevalent idea that black tea and green tea are produced by two different varieties of plant, but the difference is wholly a matter of preparation. The green variety is what makers call *unfermented* tea, and the black is *fermented*. Fermentation in this instance means about the same as oxidation. In the case of fermented tea certain oxidising ferments in the leaf are permitted to remain in it. These ferments work chemical changes in the leaf that give it its black color. At a certain stage in the process, when the organic nature of the leaf is on the point of being entirely changed, the fermenting is checked by the application of

EXPORTS OF A YEAR

heat. In case of unfermented tea the leaves are placed in a firing machine shortly after they are plucked, which prevents fermentation by closing the pores.

In black tea preparation the freshly-plucked leaves are placed under cover on bamboo, canvas or wire-netting trays, and left there for a day or two to wilt. After this they are crushed by being passed through powerful rolling machines, a process which brings the natural juices to the surface. The leaves are then spread out on tables in cool, well-ventilated rooms to ferment, as described above, after which they are again rolled, and then dried in the firing machines. Cutting machines now break up the pieces into uniform lengths, and the tea is finally sifted, graded and packed for shipment. Green tea is fired twice, the second firing occurring as soon as the leaves are taken from the rolling machines. The heating process drives off water present in the leaf and brings out the natural fragrance of the tea. Some teas are artificially scented by exposure to fresh flowers, and cheaper grades of green tea are frequently adulterated by the use of such coloring matters as powdered talc and Prussian blue. The accompanying illustration shows a reliable test for purity.

Tea Exports. The tea exported each year from the four chief tea-producing countries

A Booklet on Tea

Use three sheets of paper 9 x 12 inches, or larger, and fold once, making twelve pages.

Cover page—*Story of Tea* in center; at bottom, name of pupil, grade and school.

Illustration: Border of conventionalized blossoms.

Inside cover—Blank.

Pages one and two—Original story, *My Visit to a Japanese Tea Field.* Describe general appearance of field and tea pickers.

Illustration: Sketch of field (see halftones herewith).

Page three—Description of tea plant.

Illustration: "Close-up" view of a single shrub.

Page four—Essay, *The Good Things about Tea.*

Illustrations: Teapots and teacups of various designs.

Page five—Essay, *The Evils of Tea.*

Page six—The Oriental story of the origin of tea, told in the pupil's own words.

Illustration: Man in Chinese or Japanese garb.

Page seven—Essay, *Preparing Tea for Market.*

Illustration: Trays on which leaves are dried.

Page eight—Where tea comes from.

Illustration: Diagram or map showing countries that lead in production.

Inside back cover—Blank.

Back cover—Quotations on tea.

amounts to nearly 750,000,000 pounds. Japan and Formosa, which are the most important producers of green teas, send the bulk of their output to the United States. Formosa also produces large quantities of *oolong* tea, a black tea with the flavor of green, which has been partly fermented. The United States and Canada buy a small amount of green tea from Ceylon, India and Java, but these countries are producers of black tea almost exclusively. Ceylon and British India supply the greater part of the English demand for black tea. China, which has a large American trade, produces both green and black varieties.

The Story of Tea. The Orient has a legend to account for the origin of tea. There was a saint in India, so the story goes, who watched and prayed for many years and then one day fell asleep. On awakening he was so grieved to think that he had let his weakness overcome him that he cut off his eyelids and threw them on the ground. They took root and grew into a shrub which since that time has had the power to keep the world awake. It is known that tea was used as a beverage in China as early as the sixth century, and was extensively cultivated in Japan in the ninth, but its virtues were unknown to Europeans until the seventeenth century, when it was introduced into Europe by Dutch adventurers who had learned about it from the Chinese. In the interesting diary of Samuel Pepys one may read this entry, dated September 25, 1660:

> I did send for a cup of tea, a China drink, of which I had never drunk before.

This novel drink grew so steadily in favor that by the close of the eighteenth century it was being consumed by the English at the rate of two pounds a year per person.

The tea industry began in British India under the auspices of the East Indian Company about 1834, but the Dutch preceded the English in this field, for experiments in tea culture were made in Java as early as 1826. The industry was put on a paying basis in Formosa about 1860, and in Ceylon in 1876. An enthusiast on the subject has paraphrased the Bible thus:

> Tea is better than wine, for it leadeth not into intoxication; it is better than water, for it doth not carry disease. B.M.W.

Consult Walsh's *Tea: Its History and Mystery.*

TEACH'ING, Motivation of. The motivation of teaching consists in planning and teaching the work of the school so that the tasks of the pupil are made significant and purposeful to each child by relating them as closely as possible to his childish experiences, questions, problems, desires and needs. The child's work is motivated whenever he sees a real use in it—whenever it satisfies some need he feels, provides some value he wants, supplies some control he wishes to possess, secures some desired end, or helps him to attain any definite goal.

The goal sought may be near or remote—as near as winning the prize in a spelling contest; as far as gaining the ability and skill to construct a box kite. So long as a child comprehends more or less clearly the relationship between the work he is doing and the end sought, his work is motivated. The more definitely he appreciates this relationship and the more keenly he desires to reach the given goal, the more impelling are his motives.

It has long been held that if the school would be successful in its work, the teacher

must be guided constantly in every detail of her work by a sensible, clear-cut, definite purpose. In recent years it has come to be perfectly evident that if the pupils' work is adequately motivated, they, too, must be working always under the guidance and inspiration of a definite, attainable purpose or goal. In other words, the activities and work of the school should be so planned by the teacher that questions of vital importance to the pupils are naturally asked by them as the work progresses. These questions reveal the problems confronting the pupils and the needs they feel. The next work of the school should then be so planned that the pupils find their needs supplied, their questions answered and their problems solved.

Under their teacher's leadership, the pupils of a school decided to remember the birthday of an elderly, poverty-stricken woman who lived all alone near the school. They not only wished to send her some flowers and a more enduring present, but likewise they planned to go to her home at the dinner hour on her birthday, taking with them food for a substantial dinner and spending the early portion of the evening with her, following the dinner with an appropriate little program of entertainment consisting mainly of a talk by one of the pupils presenting the present and of singing songs which they thought she would enjoy. For a number of days, the execution of this plan afforded the children very profitable work. In the arithmetic class, they estimated how much each child should earn in order that they might have enough money with which to buy the presents and meet the expenses of the dinner. In the composition class, they developed the talk which was to be made by the pupil presenting the presents. In the music classes, they selected and practiced the songs which they sang on the evening of the birthday party. Under the inspiration of carrying through successfully what they had decided to do, their school tasks which enabled them to accomplish their end were interesting and attractive. They worked not only with enthusiasm but with accuracy.

Any teacher who wishes to motivate the work of her pupils needs, in the first place, to be so familiar with the interests and tendencies which are natural to children that she is able to think in terms of their attitudes and wishes in planning her work. School work which is built upon one or more of the following tendencies or interests which are normal to children is rather certain to be well motivated.

(1) *Earning Money and Acquiring Property.* While this tendency in children needs to be used guardedly as the basis for school work, yet every experienced teacher knows that almost irrespective of a child's age or condition, difficult tasks become attractive if one result of his work is having some money or property of his own. As employed in school, this tendency is less dangerous if the commercial gain sought goes to a group or class rather than to a single pupil. Writing or other contests in which pupils have an opportunity to participate for commercial gain are many, and excellent results to the children follow from participating in these contests, but due care should be exercised to avoid the objectionable results which follow from too great use of prizes of value in stimulating effort in school work.

(2) *Competing for Results, a Reward or an Honor.* A pupil who is striving to attain any one of these ends through school work has a strong motive for effort. The instincts of ownership, ambition, emulation, rivalry, love of approbation and courage are all appealed to. The efforts put forth by pupils in spelling, oratorical, music and debating contests are largely the result of the native tendency in children to compete for results.

(3) *Playing Games.* Play is the dominant activity in childhood. Any work which may be done, or any result which may be accomplished through play or through taking part in a game, is strongly motivated. Any child willingly prepares and practices that he may do his part well in a game. He sees that his only right to take part with a group engaged in a game is ability to aid in winning the game. Modern education makes large use of the interest of children in such games as the relay race in spelling and numbers; bean bag in language, spelling and numbers; mail carrier and Santa Claus in beginning reading; baseball in spelling and numbers, and so on. A large variety of games are employed in language work in teaching polite usage and the correct use of idiomatic language. One reason dramatization, which is so much used in reading and language work, secures such good results is because of the game and play element involved.

(4) *Making Things.* The constructive instinct is strong in children of all ages. They like to manipulate materials and see what they can produce as a result. The small child works with its blocks to see what it can produce, while the child a little older may take paper and scissors, or a piece of wood and a jack-

knife. All of the constructive and manual training work in the schools is largely based upon this interest of children. It results in the children making simple birthday or Christmas or Valentine gifts for parents or other relatives. Often the children of an entire room or class unite to produce articles needed about the schoolroom or in the corridors of the building, such as a bookcase, a rug, a couch cover, curtains, a pedestal for a piece of statuary.

(5) *Entertaining.* Children enjoy entertaining. They like to have the pupils of another room visit them or to have their parents or other mature people come as their guests. The instincts of imitation, play, sociability, expression, ambition, rivalry, love of approbation, pride, and so on, find expression in entertaining. The wise teacher, recognizing this tendency in children, makes it the basis for securing good work in all of the subjects which are drawn upon when a program is developed to provide entertainment for the guests. Such programs will usually require music, story-telling, calisthenics, reading and dramatization. The motive of entertaining well through these means supplies the impelling power which is necessary to good work in these subjects.

(6) *Sharing.* The activity of sharing is very similar to that of entertaining, and is based upon the same instinctive tendency. Just as the adult wishes to share with his friends the results of his labors, be they fragrant roses, a model dairy, or an exquisite painting, so children wish to share the products of their labors. Hard work becomes a delight when there is a prospect ahead of sharing with others the results of their efforts.

Good schools plan to give the children large opportunities for sharing with each other. Any interesting experience enjoyed by a group of children is shared with others who might enjoy it and profit by it. They might write it up and send it to different rooms or send children to talk about it in the different rooms. The school assembly, in which the entire school meets, is an excellent plan for sharing with all the best any room produces.

(7) *Advancing Self in the Estimation of Others.* Children, as well as older people, are anxious to be highly esteemed by others. What person is not happy in a task regardless of its difficulty, if he sees that it will enable him to rise worthily in the esteem of others for whose good opinion he cares? Pupils strive hard for good grades, that the teacher may think well of them, that they may merit the esteem of their classmates and that they may please their parents and others who care about their progress.

(8) *Promoting Self-development.* This motive appeals more strongly with advancing years. It leads the student to undertake tasks involving long periods of effort, sometimes months or even years. It impels the student of science to undertake difficult and extended investigations, to assume great risks and to endure great privation. Success is assured when this motive becomes dominant.

Under the influence of this motive students are found not only meeting the requirements of the teacher in the preparation of lessons, but visiting scientific and historical collections and going to other sources of help outside of the school, such as to the city, college, or state library. Such students also insist upon solving their difficult problems and performing their science experiments unaided.

(9) *Preserving Products and Collections.* This motive has a strong basis in the instincts of collecting, ownership, preservation. Children collect and preserve beautiful stones, postage stamps, pictures, postal cards, playthings, and so on. Older persons preserve letters, gifts, heirlooms or scientific collections. This motive may be invoked in getting pupils to keep well-organized outlines and complete notebooks.

(10) *Mastering and Conquering.* The instinct to subordinate and control both matter and persons is one of the most imperious of man's tendencies. It asserts itself in infancy in the child's desire to know, to understand and to rule or to lead in his group. It grows in strength with succeeding successes and is checked only when ambition is crushed. The presence of this tendency in children is the school's greatest hope of getting the pupils to do their work. The school should train children to solve problems and to meet difficulties unfalteringly.

(11) *Fitting for a Life Career.* While not functional in early childhood, the goal of preparing for a successful life career becomes a strong motive quite early with ambitious children. Under the stimulus of this motive, programs of work and hard tasks extending over a series of years are undertaken with enthusiasm and determination. An appeal to the child's desire for future success is seldom devoid of results and is most often met with a hearty response and a renewed will to work. H.B.W.

For other phases of the subject, consult the list of Related Subjects at the end of the article EDUCATION, pages 1954-1955.

TEAK, *teek,* a beautiful forest tree of the verbena family, native to Southeastern Asia. It is the source of a wood highly valued for shipbuilding and for furniture making. The special qualities of teakwood are strength, durability and resistance to water; in addition, it is easily worked, takes a high polish, and contains a resinous oil that makes it resistant to insects. In appearance the wood resembles coarse mahogany. Teak trees sometimes grow to be 200 feet in height, and are generally found in groups in forests of other trees. The leaves, which are often two feet long and a foot and a half in width, yield a purple dye. In India the British government controls most of the teak supply and derives therefrom a profitable income. Bangkok, in Siam, and the Indian cities of Rangoon and Moulmein are centers of export.

A tree known as *African teak* or *African oak,* belonging to the spurge family, is also valued for its wood, which is used for about the same purposes as the Asiatic teakwood. The African wood, however, is the less durable.

TEASEL, *te'z'l,* a genus of plants containing one commercially valuable species, the *fuller's* or *clothier's* teasel. This plant, which is

TEASEL

native to the south of Europe and has been naturalized in America, is used to raise the nap on cloth. The parts employed for this purpose are the heads of the tubular pale lilac or white flowers. These heads are cut in two and attached to a cylinder which is made to revolve against the cloth. The largest heads are used for raising the nap on blankets; the next size, for raising that on cloth for men's garments. Small, immature ones are used for fine woolens and broadcloth. Strange to say, no mechanical device has ever been invented which satisfactorily fills the place of this plant. It is a thistlelike herb with long, stemless leaves, prickly stems, and stiff, sharp bracts surrounding the flower heads.

TECHNICAL, *tek'ni kal,* **AND INDUSTRIAL EDUCATION.** The modern trend toward the practical in education is seen in the establishment of vocational courses in the public schools and in the successful operation of numerous institutions which prepare young people to earn their livelihood. Technical and industrial education is a general term covering the various forms of instruction having this end in view. Such instruction is carried on in technical high schools, in manual training classes and in trade schools, and is continued in schools of applied science and technology of college rank. Among immature students mistakes are often made because these inexperienced young people do not always know for what vocations they are best fitted. What is being done to direct such students, and to help them choose vocations in which they will be successful, is told in these volumes under the heading VOCATIONAL GUIDANCE.

The reader is also referred to the article SCHOOL, subheads *Vocational Schools, Technical Schools* and *Trade Schools,* and to the allied subjects listed at the end of the article EDUCATION.

TECK, *tek,* ALEXANDER AUGUSTUS FREDERICK, Prince of (1874-), an English army officer who was officially announced Governor-General of Canada on May 7, 1914, to succeed the Duke of Connaught, but was unable to assume office on account of the outbreak of the War of the Nations. He was ordered to the front, and in November, 1914, distinguished himself for valorous service and was promoted to the rank of colonel. His Highness is the brother of Queen Mary and the great-grandson of George III through his mother. In 1904 he married Princess Alice of Albany, granddaughter of Queen Victoria. He received his education at Eton and Sandhurst, served in the Matabeleland war in 1896, and for bravery in the South African War was given the Queen's medal, and appointed a member of the Distinguished Service Order.

TECUMSEH, *te kum'seh* (about 1775-1813), an American Indian chief, born near the site of the present city of Springfield, Ohio. He was of Shawnee and Creek stock, and seems to have been able to talk both dialects with ease. When he was about thirty-five years of age he and his brother, Tenskwatawa, known as "the Prophet," formed a great union or confederacy of Indian tribes, and about 1810 Tecumseh made a long trip through the Present Southern States to persuade the Creeks, Seminoles and other tribes to join in the plan. He was a powerful orator, and his speeches during this journey are believed to have caused the Creek War of 1813.

While he was absent his own tribe was badly defeated by General William Henry Harrison in November, 1811, at the Battle of Tippecanoe, in Indiana; during the next year the chief was appointed brigadier-general in the British army, and he rendered valuable service against the Americans in the War of 1812. Some historians have stated that the United States would have gained Canada had it not been for Tecumseh's alliance with the British. He was killed in the Battle of the Thames River in Ontario, Canada. Tecumseh was a believer in the primitive virtues of the red man; he prohibited the use of intoxicants among his tribe and did much to lead his followers back to the simple ways of their forefathers.

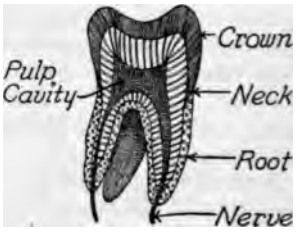
Related Subjects. The reader may consult, for explanation of references and for further information, the following articles in these volumes:

Creeks	Thames River, Battle of the
Harrison, William Henry	Tippecanoe, Battle of
Shawnee	

TE DEUM, *te de'um,* a famous Latin hymn, so called from the opening words, *Te Deum Laudamus* ("We praise Thee, oh Lord"). Though one of the most solemn and majestic church songs ever written, it is also one of the simplest, and its words have inspired many composers to set them to appropriate music. The *Te Deum* is sung in Roman Catholic churches on occasions of rejoicing and thanksgiving, and it is found in the *Breviary* (which see) and in the Anglican prayer book. The authorship is unknown, but is ascribed by tradition to Saint Augustine and Saint Ambrose.

TEETH. Like the hair and nails, the teeth are an outgrowth of the skin, the growth in this case taking the form of hard, shiny projections specially adapted for the work of cutting and tearing food and of grinding it to a pulp (see MASTICATION). Man and most of the higher animals have two sets of teeth, a temporary and a permanent set. In the case of human beings the first, or *milk,* set usually develops between the sixth and thirtieth months, and when the child is two and one-half years old it has twenty teeth. At the age of five the first of the permanent set begin to appear, but the last of these sometimes do not break through until the twenty-fifth year.

Names and Structure. There are thirty-two teeth in the permanent set of an adult, eight in each half of each jaw. In each half there are two incisors, one *canine* (called the *eyetooth* in the upper jaw, because it is just below the center of the eye), two *bicuspids* and three *molars.* Because the last of the molars develop between the seventeenth and twenty-fifth years they are called the wisdom teeth. The bicuspids take the place of the temporary molars, but all of the permanent molars, twelve in number, are entirely new teeth.

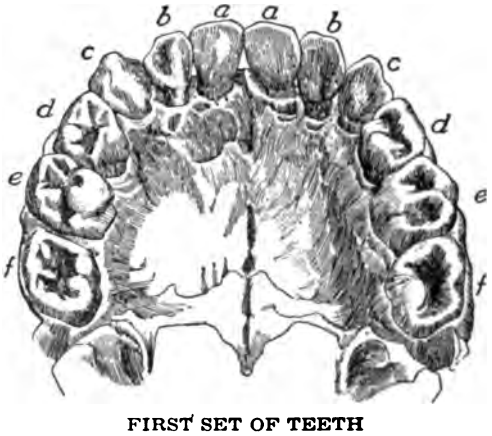


LONGITUDINAL SECTION OF A TOOTH

Each tooth has three parts—the *crown,* that part seen in the mouth; the *root,* the part embedded in the jawbone; and the *neck,* or *cervix,* a narrowed portion between the crown and root. The jaw is furnished with sockets called *alveoli,* into which the teeth fit. The various kinds of teeth differ considerably in regard to the shape of the crown. That of an incisor is shaped something like a chisel, with sharp, horizontal cutting edges, for the incisors are used to bite or gnaw off the food. The canines *(dogteeth)* have thicker crowns, shaped somewhat like a cone, with a central point on the cutting edge. In the case of dogs and cats the canines are very long and pointed, for with them these creatures grasp and hold their prey. The bicuspids are not so long as the canines and are somewhat cube shaped. Each has an inner and an outer point, or *cusp,* on the cutting edge. Hence the name, which means *two-cusped.* The molars, or grinders *(mill teeth),* are provided with large crowns roughened in such a way as to adapt them to crushing and grinding the food. The molars of the upper jaw have three roots; those in the lower have two.

During the life of a tooth a soft pulp, containing nerves and blood vessels, fills a cavity known as the *root canal,* which extends through crown and root. Immediately surrounding the cavity, and making up the greater part of the bulk of the tooth, is a hard, bony, yet elastic, substance called *dentine.* This is covered on the crown with *enamel,* a tissue so hard that it will strike fire with flint. The root of the tooth is fixed in place by a thin layer of bone known as *cementum,* and at its tip is a narrow aperture through which the blood vessels and nerves of the pulp cavity enter. Exposure to the air of these delicate nerves, through decay of the outer parts of the tooth, is responsible for the agonies of toothache.

Care of the Teeth. Because the inside of the mouth is always moist and warm it is a very favorable breeding place for germs of all kinds. A neglected mouth may harbor organisms that cause diphtheria, pneumonia and other infectious diseases. Furthermore, accumulations of food particles, collecting in the spaces between the teeth, at the margin of the gums and elsewhere, encourage the multiplication of countless bacteria which form acids on exposed surfaces of the teeth. These acids eat into the protecting enamel, and if no steps are taken to prevent further harm, ultimately cause the teeth to decay. For these reasons the mouth

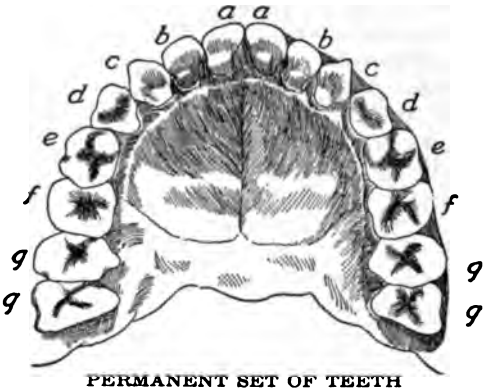


FIRST SET OF TEETH

(*a*) Central incisors; (*b*) lateral incisors; (*c*) cuspids; (*d, e*) temporary molars; (*f*) sixth-year molars.

and teeth should be scrupulously cared for from infancy to the end of life. Parents who think the temporary teeth need no attention are badly in error. The first teeth of the small infant should be cleaned at least twice a day with a soft brush, and just as soon as the child is old enough to handle a brush he should be taught to perform this hygienic act for himself. Neglected teeth in the mouth of a little child are a source of physical pain and a detriment to thorough chewing and to the general health, and they have an adverse effect on the teeth which come later.

Not only should the teeth be thoroughly scrubbed, but the gums and back of the tongue



PERMANENT SET OF TEETH

(*a*) Central incisors; (*b*) lateral incisors; (*c*) cuspids; (*d, e*) bicuspids; (*f*) sixth-year molars; (*g*) molars.

also need daily cleansing. In addition to a good, moderately-stiff brush one should have in the toilet equipment a reliable tooth paste or powder and an antiseptic mouth wash. Advice on these matters is always cheerfully furnished by the family dentist, who should be visited at least twice a year by each member of the family. The custom of brushing the teeth sidewise has fallen into disfavor, as this method lacks thoroughness. Instead, the brush should be placed upon the gum and be manipulated with a rotary movement upward on the lower teeth and downward on the upper. The teeth should be cleaned on the inside and out, and back to the last molars, and the mouth be rinsed by forcing water between the teeth. In addition, after each meal (but away from the table) the crevices of the teeth should be cleaned with a quill toothpick and dental floss. If possible, a brushing should be given after each meal, but under no circumstances should one omit it at night before retiring. If such precautions are taken, and the teeth are cleaned and examined twice a year by a reliable dentist, decay of these important organs can usually be prevented, or at least materially checked.

Aside from neglect of the mouth, unhygienic habits of eating may affect the teeth. The custom of bolting the food, or of including too great a proportion of soft and partly-digested foods in the diet, interferes with that vigorous

exercise of chewing so essential to the health of the teeth. The diet should be one that requires considerable mastication, and it may well include such acid fruits as apples, oranges and grapefruit, all of which tend to keep the teeth clean. Another deplorable habit is that of breathing through the mouth, which causes dry, unhealthy gums. This is often due to enlarged tonsils or adenoids (which see), and mothers and teachers everywhere should be on the watch to detect these conditions. It should be borne in mind that bad teeth are often a cause of disease elsewhere in the body, for cavities due to decay mean a possible source of infection.

Pyorrhoea is one of the most serious diseases of the teeth. Its scientific name, *pyorrhoea alveolaris,* more accurately suggests its character, as it is a disease of the alveoli, or sockets. It begins beneath the edges of the gums, where there has been an accumulation of lime deposits, or tartar, and as the infection progresses it gradually destroys the membranes that attach the root of the tooth to the bony socket. As a result, the teeth slowly loosen and cannot be used effectively in mastication. If the infection is not checked the teeth must eventually be extracted.

This, however, is not the only evil effect. Pus is formed in the pyorrhoea pockets caused by the broken-down tissue, and is constantly discharged into the mouth and swallowed. As a result, bacteria are forced into the circulation and carried to remote parts of the body. Diseases of the heart, kidneys and other organs, as well as many minor ills, are sometimes directly traceable to infection of the teeth, and for this reason diligent care of the mouth is imperative. The preventive measures outlined above in the subhead *Care of the Teeth* have a direct bearing on this subject. In case of the establishment of the infection the patient should at once be placed in the care of a reliable dentist, that the disease may receive proper treatment. W.F.L.

Related Subjects. The following articles in these volumes may be consulted in connection with the study of the teeth:

Dentistry	Health Habits
Digestion	Mastication
Fletcherizing	Mouth

TEG'NÉR, ESAIAS (1782-1846), a Swedish poet, born at Kyrkerud. He was educated in the schools of his native town and at the University of Lund, Sweden, where he was a tutor and a Greek lecturer from 1802 to 1810; later he was chosen as professor of Greek and remained in this work until his appointment as bishop of Vexiö in 1824. His first success as a poet came in 1808, when he wrote a war song notable for its vigor. Three years later he wrote the patriotic ode *Svea,* which stirred all Sweden, and for which he was crowned by the Swedish Academy. During this same year he founded the Gothic League of Sweden, established for promoting the study of old Scandinavian history and literature, and to its magazine he contributed some of his best critical discussions and verses.

In 1817 he wrote his famous *Song to the Sun,* and the outside world began to discuss him. Later appeared his three masterpieces, the romance *Axel;* the delicate idyll, or pen picture, entitled *The First Communion,* translated in later years by Longfellow; and the poem which Goethe called "the old, mighty, gigantic, barbaric epic," *The Story of Frithjof.* This latter tale, based upon the ancient legends of Northern Europe, is by far the best known of all Swedish writings, and is said to have been translated twenty times into German and twenty-two times into English. About the date this poem was finished Tegnér fell madly in love with the wife of a Lund official, and for the next fifteen years this passion preyed upon his mind until in 1840 he became insane. Within a year he was pronounced cured, but in 1843 apoplexy seemed to renew the malady, and he did no more work of importance. He wrote a large number of beautiful songs, but his fame rests on *The Story of Frithjof.*

TEGUCIGALPA, *ta goo se gahl'pah,* the capital and largest city of the republic of Honduras, in Central America. It is situated on a plain surrounded by mountains, on the Choluteca River, about seventy-eight miles from the Gulf of Fonseca, an arm of the Pacific. It is the center of a fertile agricultural district, the most densely populated in the republic. The most imposing building in the city is the cathedral. There are located here a central university with departments of law, medicine, science and political sciences, a military school and a Central Institute for secondary work. A fine ten-arched bridge spans the river and joins Tegucigalpa with its chief suburb, Concepcion. One of the attractive features of the place is a central park containing a statue of one of the chief statesmen of Honduras. Population in 1914, 28,950.

TEHERAN, *teh'rahn',* the metropolis and capital city of Persia, is situated at the base of

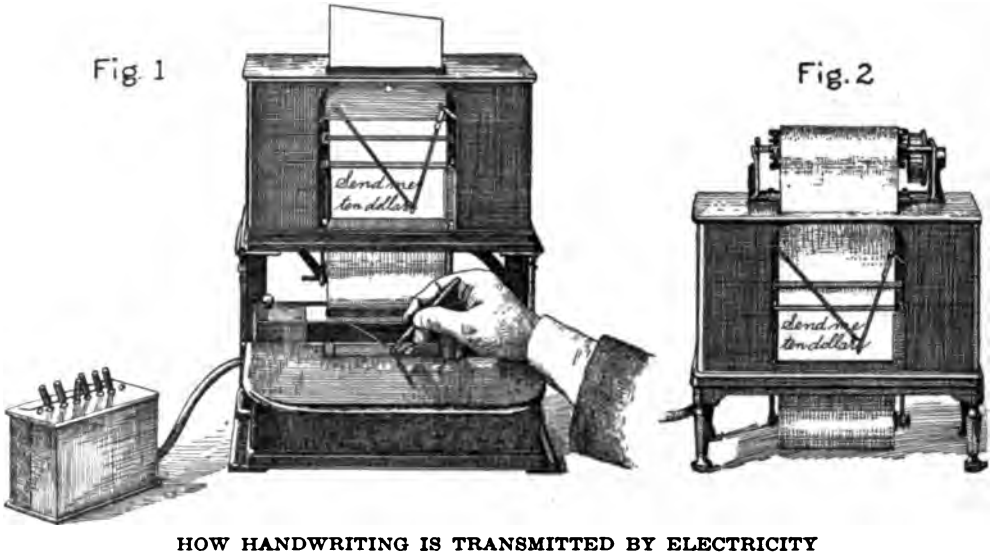
a snow-clad peak of the Elburz Mountains, about seventy miles south of the Caspian Sea and 210 miles north of Ispahan (see map of Asia, opposite page 417). Though it has developed as a typical Oriental city, with narrow streets and low, flat-roofed dwelling houses (see picture, page 4594), Teheran is gradually acquiring modern improvements.

The city lies in a region made productive by water conducted from the mountains through underground canals. These canals also provide the inhabitants with their water supply. Caravans bring their merchandise to this market, and the people carry on in a modest way the manufacture of cotton, linen, carpets, ironwork, hats and shoes. There are tramways within the place, and a local railway line extends from Teheran to a suburb six miles distant. There is connection also with Resht, 217 miles away on the Caspian Sea, by a good carriage road. Harun-al-Rashid (which see), of *Arabian Nights* fame, was born in the vicinity of Teheran. In the summer unpleasant climatic conditions drive the wealthier residents to the mountains. In the winter there are more than 280,000 inhabitants in the city, of whom about 600 are Europeans.

TEHUANTEPEC, *ta wahn ta pek',* **Isthmus of,** the narrowest portion of the American continent north of Costa Rica. It comprises that part of Mexico lying between the Gulf of Campeche, an arm of the Gulf of Mexico, and the Gulf of Tehuantepec, a part of the Pacific, and includes the southeastern parts of the states of Vera Cruz and Oaxaca and small districts of Chiapas and Lobasco. The isthmus is 120 miles across at its narrowest point; its mountains are broad and low, and since the days of Cortez it has been considered a favorable route for an interoceanic canal or railway. In 1907 a railroad 150 miles long, joining Coatzacoalcos on the Atlantic and Salina Cruz on the Pacific, was opened for traffic. It is operated jointly by the Mexican government and the constructing company, an English firm.

TELAUTOGRAPH, *tel aw' ton graf,* an instrument for transmitting writing by electricity. A *facsimile* of what is written or drawn on the transmitter is instantaneously reproduced and recorded by receiving instruments at one or more stations, each of which is connected to the transmitting station by two lines of wire carrying an electric current.

The machine is about as wide as an ordinary typewriter and somewhat taller. It is placed on a desk or table in a position convenient for the hand. The metal writing stylus resembles an ordinary lead pencil, and has two silk cords attached near the point and connected with the transmitter. By its movements over the metal plate, the stylus sends varying currents through these cords and over the line wires connected with other stations, which electrically operate the distant receiving pens. These pens reproduce the same motions, thus duplicating the writing. The receiving pen is a modification of an ordinary draughting pen, and is moved by supporting arms connected with the live wires. When not in use the pen rests with its point



HOW HANDWRITING IS TRANSMITTED BY ELECTRICITY
Fig. 1 shows the transmitting, or sending, station; Fig. 2 is the receiving station.

in an ink bottle fixed at the side of the plate over which the recording paper passes.

The telautograph is one of the most useful and accurate of all efficiency machines. It transmits a message with speed and exactness and is invaluable for recording and comparing signatures in banks. It is extensively used in hotels, department stores and other large business establishments to send messages to various rooms or departments, and is very useful in noisy places where the use of the telephone is difficult. This instrument is also utilized for writing messages on bulletin boards, visible to large crowds of people, such as gather on election days when political feeling runs high. It was invented by Elisha Gray.

TELEGRAPH, *tel' e graf*, a device for sending messages to a distant place by means of signals which represent words or ideas, as distinguished from the telephone, in which spoken words are reproduced at a distance. The word *telegraph* means *to write afar off*. The electromagnetic telegraph has displaced all other forms, hence the word is now understood to mean a device in which electricity is used in the transmission of signals to a distance. The electric telegraph ranks as one of the greatest civilizing agencies the world has ever known. It has revolutionized the means of communication. It has brought widely-separated nations into the relationship of near neighbors, making them acquainted rapidly with all the arts of peace and as thoroughly serving them in the business of war.

The Speed of Telegraphy. "As quick as a wink" is a homely phrase for instant action, but no human effort can match the telegraph for instantaneous effects. A telegraph operator presses his key in New York City; when his instrument clicks in response to that pressure a sounder at the other end of the line in San Francisco will at almost the same indivisible fraction of a second respond to the impulse that has traveled the breadth of a great continent. When Queen Victoria died papers announcing her death were selling on the streets of American cities thirty minutes after the event and before the slower English editors had printed the same information. The result of a horse race in Havana is known to thousands of sportsmen in all sections of America before the winning horse is led off the track. In early colonial days a Bostonian wishing to get word to a man in New York might be able to journey back and forth in possibly twenty days. To-day he can call a messenger boy electrically, send a telegram, and, barring human delays, get an answer in about as many minutes, at a cost of a few cents. At daylight on a morning in July, 1917, the English exploded a dozen mines at Messines, Northern Belgium, which they had planted under the Germans. Before daylight across the western sea papers containing the news were being delivered to their readers.

Such facts as these proclaim the marvel of the telegraph. Because of it "a girdle can be put around the world" in a few minutes, and the news of feast or famine, coronation or death in India becomes a theme for congratulation or sympathy in an hour in the Western world. A telegram has reached Sydney, Australia, from New York City by direct wire in three seconds —an electrical impulse pushed through twelve thousand miles of resisting wire, over mountains and under oceans, in about the time you need to walk twelve feet.

Development. The first message over the telegraph wire, between Washington and Baltimore, in 1844, was "What hath God wrought?" The marvel of that crude, first instrument suggested powers almost supernatural, yet man has taken these physical forces which he understands yet only in part and has employed them to carry his message to the uttermost parts of the earth.

To accomplish this he has demanded almost 6,500,000 miles of wire for his telegraph and submarine cables—enough wire to stretch 260 times around the world. Of the land lines the

United States possesses about 1,500,000 miles of wire, or twenty-five per cent of the lines of the world; Canada has 135,000 miles. The total land telegraph investment of the world, including wires, offices and all equipment, is $700,000,000; the cable systems cost $350,000,000. There is, therefore, over a billion dollars applied to an invention which was unknown within the memory of men yet living and which is yet a novelty in many thickly-settled countries. E.D.F.

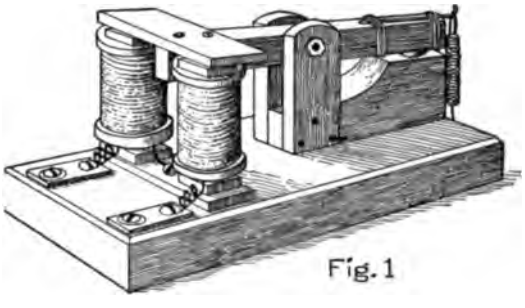
The Making of the Telegraph

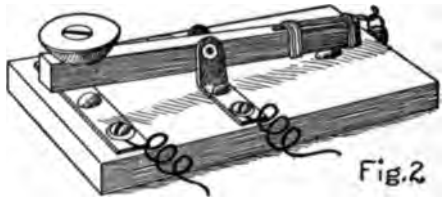
Telegraph and Doorbell Compared. An electric doorbell circuit is similar to a telegraph circuit. When a caller arrives at the door he telegraphs the fact of his arrival by means of the electric bell. The bell corresponds to the telegraph sounder. The push button at the door corresponds to the telegraph key. If two wires are connected to an electric battery and to an electric bell, the bell rings because the current from the battery flows through the coils of the electromagnet which is part of the bell. If one of the wires is cut and the ends are separated, the bell ceases to ring because the circuit is open and the current cannot flow. If the ends of the cut wire are pressed together the bell again rings.

It would be inconvenient to press the ends of two wires together every time one wished to ring the bell, so a push button is used, the end of one wire being connected to a spring and the end of the other to a second spring under the first. When the button is pressed the two springs are pressed together and this is the same as pressing the ends of the wires together. Pressing the button causes the bell to ring, because this closes the circuit and permits the current from the battery to flow through the bell. See ELECTRIC BELL, page 1983.

In the telegraph, pressing the key closes the circuit and permits a current to flow through the electromagnet coils of the sounder. The electromagnet then pulls a piece of iron called an *armature;* it pulls only when a current is flowing through the coils of the magnet. When the key at the sending station is pressed down, it makes an electrical contact which closes the circuit and permits a current to flow through the electromagnet coils of the receiving instrument. The electromagnet then attracts the iron armature, pulling it down, and with it the brass arm of the sounder. This causes a click. When the key is released the circuit is broken, the current ceases in the electromagnet, the sounder arm is released, and the spring pulls it up, causing a second click.

A Simple Telegraph. Two boys can easily set up a telegraph line between their homes. Two sounders, two keys, and one electric battery, which may consist of two or three dry cells, which may be purchased for a slight sum, are needed. The magnet of an old electric bell can be used in making the sounder, or an electromagnet can be made, as follows:





A BOY CAN MAKE A SIMPLE SOUNDER AND KEY

With a hack saw or a file cut off two pieces of soft iron rod, each about an inch and a half long, and file the ends smooth. Cut out two round disks of hard fiber or stiff cardboard and fit them to the ends of the iron rods so as to form spools. Wind about fifty turns of magnet wire on each rod, winding the two coils in the same direction. The two coils are to stand upright on the base of the instrument and to rest on a strip of iron. It is better if the strip of iron can be fastened to the rods with machine screws, but this is not necessary. Connect the coils so that when connected to a battery the upper end of one rod is a north pole and the upper end of the other is a south pole. The polarity can be tested by means of a pocket compass. Another strip of iron is used for the

armature of the magnet. This armature is fastened to an arm of brass or wood. The arm is pivoted and held up by a rubber band or a spring made of brass or steel wire. The sounder then appears as in Fig. 1. A key for opening and closing the circuit can be made of a piece of spring brass or spring steel, or an ordinary bell push button can be used. The key will then appear about as in Fig. 2. Only one line wire is needed. For the ground connec-

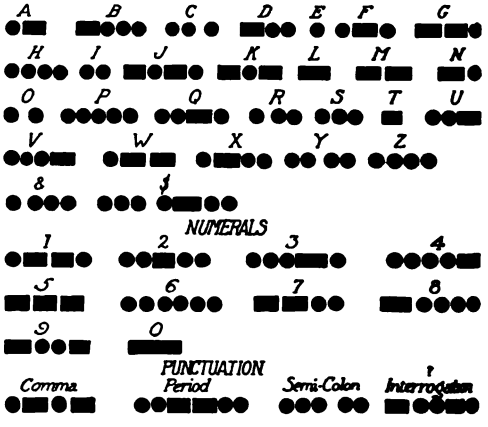
ORDINARY KEY AND SOUNDER

tions connect the wires to gas or water pipes. A key and sounder similar to that shown in the above illustration may be purchased for less than five dollars.

The Ground. Connecting the ends of the line to the earth makes it possible to use only one wire, the earth taking the place of the return wire. We may think of the earth as a great reservoir of electricity. An electric charge which goes along the line into the earth does not return to the other end of the line, but another charge goes from the earth into the line. We may compare such a current to a current of water in a pipe laid along the shore of a lake. Water is pumped in at one end of the pipe, and it flows out at the other end into the lake. The water which flows out of the pipe into the lake does not return to the other end of the pipe, nevertheless the lake furnishes a supply of water so that the current flows as long as the pump continues to work. In a similar way the electric current in a single wire telegraph line continues to flow as long as the battery or dynamo continues to work.

The Relay. For long-distance work the current from a battery, or even from a dynamo, is too feeble to operate the sounder. This is true because of the resistance a long line wire offers to the passage of the electric current. The practical limit of the single telegraph line in fair weather is about 450 miles; in rainy weather the limit is from 150 to 250 miles. However, messages are sent in all kinds of weather over distances of thousands of miles. This is accomplished by means of a *relay*. A relay is a contact key which is operated by means of an electromagnet. It is operated in the same way as a sounder. Suppose that when the armature of a sounder is pulled down by the magnet it brings two contacts together and closes another circuit. The sounder would then be a relay. The circuit which is closed by the relay may be hundreds of miles long or it may be only a few feet. A relay used in this manner to send a message on to a more distant station is called a *repeater*. At the farther end of the second line there may be a second relay which closes a third circuit. A message may be sent to any desired distance by using a sufficient number of relays.

The Codes. There are two codes in general use, the Morse and the Continental. The Morse code is used in the United States and Canada, and the Continental code has been adopted in all other countries. For communication by cable between the United States and other nations the Continental code is used. The signals of the Continental code consist of dots and dashes; those of the Morse code consist of dots, dashes and spaces. The letters which occur most frequently have the simplest symbols; for example, the letter *e* is represented by one dot and the letter *t* by one dash in both systems. A dot is made by quickly pressing and releasing the key, producing a rapid *click-clack* sound in the receiver. A short dash is twice as long



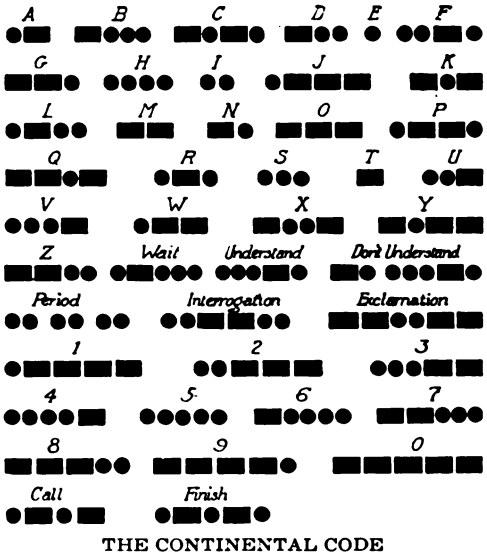
THE MORSE CODE

Dots, dashes and spaces are employed to form the letters.

as a dot. A long dash, as for the letter *l*, is equal to four dots. The space between the dots and dashes that make up a letter is equal in length to the dot. The space between the letters of a word is equal to three dots and the space between words to six dots. A space which

is part of a letter combination is equal to two dots.

Sending Four Messages at One Time over One Wire. One of the marvelous achievements in telegraphy is that of sending a number of messages at one time over one wire. One electric current can be made to convey four messages



THE CONTINENTAL CODE

Dots and dashes are employed to form the letters. Spaces are used only to indicate the end of one letter and the beginning of the next.

at one time, two going in one direction and two in the opposite direction, and the messages do not interfere with each other. To send two messages at one time in opposite directions the instruments must be so arranged that the sounder is in the circuit but is not affected by the sending instrument at the same station.

A telegraph system by means of which two messages can be sent at one time is called a *duplex system*. In the duplex system the making and breaking of the circuit operates the sounder, regardless of the direction in which the current flows. In another system of duplex telegraphy it is by changes in the direction of the current that the signal is transmitted. When these two systems are combined in one wire a single current will transmit four messages at one time, developing a *quadruplex,* or fourfold, system. We may think of the fourfold system as working in the following manner:

There are two receivers and two sending instruments at each end of the line, all connected to one line wire. They are so arranged that the outgoing messages from station 1 do not affect the receiving instruments at station 1. Messages sent from station 1 affect only the sounders at station 2. A constant current is flowing in the line, but the receiving instruments are so arranged that none of them is moved by this current unless a change is made either in the direction or the strength of the current. If the direction of the current is changed at station 1, one sounder at station 2 responds with a click, but the other sounder at station 2 is not affected. If the strength of the current is changed at station 1 the second sounder at station 2 responds. Thus two signals are sent at the same time from station 1 to station 2. In the same way and at the same time two signals may be sent from station 2 to station 1.

Every telegraph line of importance is at least arranged for duplex telegraphy and many are quadruplexed.

Use of the Dynamo. For long-distance telegraphy dynamos are used to supply current to the line. They occupy less space and are more economical than batteries. A generating plant sufficient to operate a thousand lines may be installed in a small room. The lines may vary in length from fifty to 500 miles.

Batteries. When batteries are used for long-distance work, storage cells are always used. The gravity, or Daniell, cell is used for local circuits only, and even for local circuits storage cells are frequently used.

Telegraphing without Wires. See WIRELESS TELEGRAPH.

Submarine Telegraph. See CABLE, SUBMARINE.

Printing Telegraph. The printing telegraph delivers the message in printed form on a tape or in typewritten pages. The operator need not know the Morse code. He operates a typewriter keyboard as if he were typewriting a letter. In some forms of printing telegraph a special form of typewriter receives the message. Each key of the receiving typewriter is controlled by a small electromagnet. Each of these electromagnets has its own combination of electric impulses to which it responds and which is sent over the line when the corresponding key is depressed at the sending end. Four messages, two in each direction, may be sent at one time over the line by the printing telegraph. The *stock ticker* is a form of printing telegraph in which the messages are printed on a tape. It is used in telegraphing market quotations.

High-Speed Telegraphy. An automatic device for operating the electrical contacts makes

it possible to send one thousand or more words per minute. The message is prepared on a tape somewhat after the manner of the music roll of a piano player. This tape is run through the sending instrument by clockwork and operates the contacts. An automatic receiver records the message, which may be preserved and read at leisure. E.E.B.

Historical Sketch

A telegraph consisting of a system of semaphore signals was used in the latter part of the eighteenth century. France had the most extensive system of this kind, connecting Paris with all the principal cities of the country, a semaphore every three miles. The device in those days was considered wonderful.

Benjamin Franklin was the first to conceive the idea of telegraphing by means of electricity and to leave a record of his experiments. He tried the experiment with four miles of wire, but the electric battery was then unknown, and the discharge from an electrical machine or a Leyden jar could not be used for a practical telegraph. The invention of the electric battery in the last year of the eighteenth century revived the idea of an electric telegraph. Every known means of producing an electric current or a static electric charge, and every known effect of an electric current up to the time of Morse's invention, had been used in attempts to invent a telegraph. No success was possible, however, until the electromagnet had been discovered and perfected.

The discovery of Oersted that an electric current flowing along a wire will cause a compass needle to turn when the wire is held in a certain position over the needle led to the invention of the needle telegraph. In the needle telegraph the receiver was simply a magnetic compass placed in a coil of wire. When the circuit was closed at the sending end the needle moved; the movements of the needle indicated the letters of the alphabet. A number of needle telegraphs were invented, and some of them were used commercially. The Cooke and Wheatstone needle telegraph was employed in England as late as the year 1870, but it was not successful over long distances.

The device that made long-distance telegraphy possible is due to Joseph Henry, whose discovery consisted of a means of increasing the strength of an electromagnet by winding many turns of insulated wire upon the coil so that even a feeble current would produce considerable magnetic strength. Samuel F. B. Morse made use of the discovery of Henry and devised a practical system which was the beginning of the modern telegraph.

Morse had difficulty in convincing men of the value of his invention. Private investors would not give him a hearing, and he despaired until finally the United States government appropriated $30,000 for a test. A line was built from Washington to Baltimore, but even the Congressmen who voted the money for the experiment ridiculed the inventor and his device. The first words sent over this line, quoted above, were suggested by a young lady who was present at the experiment.

The Democratic national convention was then in session at Baltimore. A Senator named Wright was nominated for Vice-President the following day; the news was telegraphed to Washington and Morse advised the nominee of the honor. He said, "Tell them that I refuse the nomination." Not realizing that a new force had been demonstrated to the world and failing to see how the declination could have come so quickly from Washington, the friends of the nominee believed the story to be an invention of the opposition. They accordingly sent a delegation to visit him, and there learned the means by which his refusal had reached Baltimore. On the following day James K. Polk was named for President of the United States, and the fact was published briefly in a Washington paper under the heading "Telegraphic News." This was the first incident of the kind in the world's history. E.E.B.

Consult Edison's *Telegraphy Self-Taught;* Jones' *Telegraphy for Beginners;* Sewell's *Lessons in Telegraphy;* Houston and Kennedy's *Electric Telegraph.*

Related Subjects. The reader will find interesting supplementary matter about telegraphy in the following articles in these volumes:

Cable, Submarine	Morse, Samuel F. B.
Dynamo	Telephone
Electricity	Wireless Telegraph

TELEGRAPH, WIRELESS. See WIRELESS TELEGRAPH.

TELEPATHY, *te lep'a thi,* the influencing of one mind by another at a distance without the use of ordinary means of communication. Telepathy rests upon clairvoyance (which see) for its foundation. The mind is aroused to action in two ways, by impressions received through the senses and by intuition. The mind

when acting upon impressions received through the senses is considered as the *objective mind;* when acting from intuition, the *subjective mind.* Telepathy is possible only when each mind concerned is in a subjective state. Furthermore, there must be a bond of sympathy between the persons.

Those who argue in favor of telepathy claim that when two people, A and B, are in the same room the mind of one acts upon the mind of the other in such a way as to produce the mental results desired by A upon B without any words, looks or other visible means of communication. A good illustration of this is found in the old game of "Willing." A wills that B perform a certain act, and B complies without any visible sign of communication. The Society for Psychical Research after extended investigation decided that in most cases there is some means of communication which the observer is not able to detect, because when the persons are in separate rooms the instances of success are no more than can be accounted for by chance. For instance, A wills that B write the number 10 on a card. There is a chance that A and B may be thinking of the same number, and that the number 10 will be written. On the other hand, there is a strong probability that they will not be thinking of the same number unless there is collusion. The experiments referred to showed ninety cases of success with A and B in the same room, when chance should allow only eight. With A and B in different rooms the instances of success were no more than could be accounted for by chance.

Those who accept the hypothesis of telepathy make use of it to account for warnings and messages from distant friends in times of special stress or danger, and to account for other similar phenomena.

There is a wide difference of opinion concerning the validity of the hypothesis on the part of those who have given the subject careful study. Some reject the theory entirely, while others believe that some evidence in its favor is "tangible," though not sufficient to warrant a full acceptance of the hypothesis. W.F.R.

Consult Jastrow's *Fact and Fable in Psychology;* Hyslop's *Psychical Research and Survival.*

Relating to Various Beliefs. The articles on the following topics, while not bearing directly on the subject treated above, may be of interest in this connection:

Alchemy	Conjuring
Astrology	Demonology
Clairvoyance	Divination
Faith Cure	Physiognomy
Hypnotism	Psychical Research
Magic	Psycho-Analysis
Medium	Spiritualism
Mesmerism	Subconscious
Mind Reading	Suggestion
Necromancy	Superstition
Occult	Theosophy
Palmistry	Trance
Phrenology	Witchcraft

TELEPHONE, *tel'e fohn,* a device for reproducing vocal sounds at a distance. The word means *to produce a sound afar off.* So perfect to-day is the instrument we call the telephone that the voice of a friend, in low tones over a thousand miles of wire, may be heard as distinctly and be as easily recognized as though the speaker were in an adjoining room, with open doors between. The transmission of the sound of the voice is instantaneous; while a word is being spoken into the transmitting device it is at the same time being heard in a receiving instrument, no matter how many miles away. The modest claims of an inventor in 1876, which nobody believed, were in a very few years developed into one of the most gigantic enterprises the world has ever seen. So new is the telephone that fully half of the people who are living to-day remember when they saw the first imperfect instruments.

Description of the Modern Telephone. A number of devices for reproducing the sounds of the voice have been tried, but the only one that has proved successful for practical use is the electric telephone.

In the modern electric telephone an alternating current flows along the line wire and reproduces the sound at the receiving end. Sound travels in copper wire with a speed of about two miles per second; if it were the sound which traveled over the telephone line it would require a thousand seconds, or more than sixteen minutes, to receive an answer to a spoken message over a line a thousand miles in length, since it would require five hundred seconds for the message to travel each way. The telephone does not transmit sound; it transmits an electric current and reproduces sound.

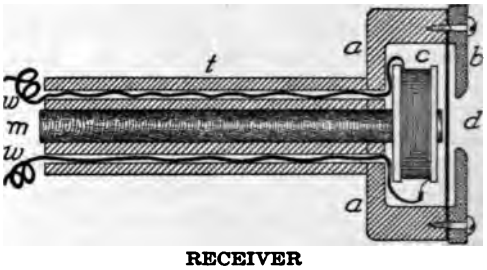
The Receiver. The telephone receiver consists of a steel magnet having a coil of fine wire around one end, and near to this end a disk or diaphragm of soft iron, held in place by a hard rubber casing (see illustration in subhead *How to Make a Simple Telephone*). When an electric current flows through the coil in the receiver in one direction it strengthens the magnetic field. This is the case when the magnetic force of the coil acts in the same direction

as that of the steel magnet. When the current flows in the opposite direction its own magnetic force is opposed to that of the steel magnet and, therefore, it weakens the magnetic field (see ELECTROMAGNET).

Since the current which flows over the telephone line wire from the transmitter is alternating, the magnetic field is alternately strengthened and weakened. The repeated changing of the magnetic force sets the disk vibrating. When the magnetic pull is stronger, the disk is pulled inward; when the pull is weaker, the disk is released and springs outward. The disk in the receiver is thus made to vibrate the same number of times per second as the disk in the transmitter; for every vibration of the transmitter diaphragm there is produced a similar vibration of the receiver diaphragm. The receiver diaphragm sets the air vibrating and produces sound waves of the same kind as those that are acting upon the transmitter diaphragm.

The Microphone. A simple instrument which illustrates the working of the telephone transmitter can be made of three electric light carbons. Two of the carbons are laid on a board a few inches apart, and the third carbon is laid across the first two. The first two carbons are then connected to a battery and telephone receiver. If a watch is laid on the board the ticking of the watch can be heard in the receiver. The ticking jars the board and each jar moves the upper carbon just a little and loosens the contact between the carbons. Between the ticks of the watch the upper carbon drops down and presses more firmly on the lower carbons. When the contact is loosened the battery current is made weaker, while a firmer contact makes the battery current stronger; thus as the watch ticks the battery current becomes alternately stronger and weaker. Each time the current becomes stronger the electromagnet in the receiver jerks the metal disk, and then the magnet lets the disk spring back as the current becomes weaker. Thus the disk is jerked back and forth as the watch ticks, and this motion of the disk produces sound in the air, the same kind of sound as the ticking of the watch.

The Transmitter. The telephone transmitter is a specially designed microphone. Two polished plates of carbon form the front and back of a circular box which is filled with carbon granules. The sides of the box are of insulating material, such as hard rubber. The carbon plate which forms the front of the box is attached firmly to the center of a metal diaphragm, which is just back of the mouthpiece (see page 5739). When one speaks near the mouthpiece the sound waves in the air set the disk in vibration; the carbon plate attached to the disk moves in and out a little as the disk vibrates. As the carbon plate moves in and out it repeatedly changes the pressure on the carbon granules, crowding them more tightly



RECEIVER

Simple construction, showing parts, such as a boy can master. The parts are (*a*) wooden pill box; (*b*) cap; (*c*) thin, flat spool, wound with copper wire; (*d*) thin disk of metal; (*t*) tube; (*w*) wires; (*m*) magnet.

together and releasing them many times a second. The carbon granules form a microphone, like the carbon rods, but with many contact points instead of two. A battery current flows through the carbon granules, and as the pressure on them changes the strength of the battery current changes; for when the granules are more tightly crowded together more current can flow, and when the granules are loosened less current can flow. Thus when the diaphragm vibrates the battery current continually varies in strength.

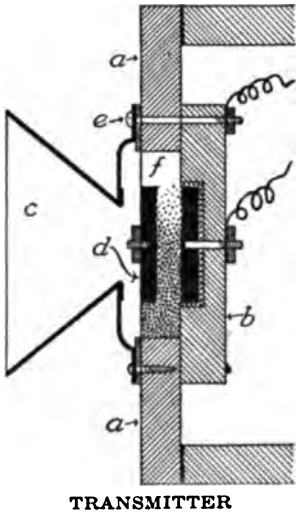
The battery current flows through the primary winding of a small induction coil, which is usually placed in the box back of the mouthpiece. As the battery current in the primary winding varies in strength, an alternating current is induced in the secondary winding of the induction coil. It is this alternating current which flows along the line wire to the receiver at the other end of the line. This alternating current varies as the sound of the voice varies, alternating more rapidly for sounds of higher pitch than for sounds of lower pitch, changing in strength as the sound changes in intensity, so that the pitch, the intensity and the quality of the sound produce corresponding frequency, intensity and form of electrical vibration. This in turn reproduces sound of the same quality and pitch as the original sound, but of less intensity because of loss of power in the line.

The Switchboard. The switchboard in a telephone exchange is for the purpose of making

electrical connection between the instruments of persons desiring to talk with each other. The one who makes the call removes his receiver from the hook and a "drop" at the switchboard is released, showing the telephone number of the person making the call. At the same instant the lighting of a small electric bulb calls the attention of the operator to the call. The operator then inserts an "answering plug" corresponding to the number calling. After ascertaining the number wanted the operator inserts the "calling plug" in that number and presses a key which closes the ringing circuit of the party who is being called; then she throws the key into position for talking. A plug consists of the ring-shaped terminals of the wires in the connecting cord.

The multiple switchboard used in large exchanges is so arranged that each operator can call from her own section of the switchboard any subscriber whose line is connected with that exchange, but she can be called by only a limited number. The advantages are that the calls are divided among a number of operators, and each operator can complete any call from her own section of the switchboard.

How to Make a Simple Telephone. Two boys can easily make and set up between their homes a good, working telephone line. It will be necessary to have two telephone receivers, which will serve also as transmitters. The receivers may be purchased in an electrical shop, or they may be made as follows: Cut off a piece of curtain pole about one inch and one-eighth in diameter and three and one-half inches long; or, if a wood-turning lathe is at hand, turn out such a piece. Bore a hole three-eighths of an inch in diameter lengthwise through the center. Bore two holes one-sixteenth inch in diameter lengthwise through the rod by the side of the first hole. The last two holes are for the wires to pass through.



TRANSMITTER

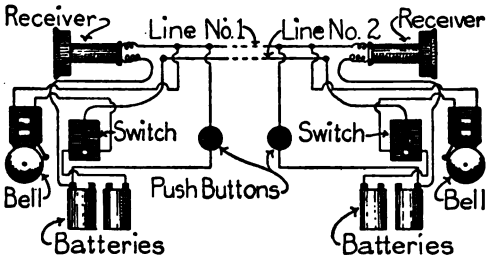
Simple sketch of the mechanism which receives and transmits the words spoken in telephone conversation. The parts are (*a*) cover; (*b*) round or square block; (*c*) mouthpiece; (*d*) diaphragm; (*e*) bolt; (*f*) granules of carbon.

A round, wooden box about two and one-half inches in diameter is needed; a wooden pill box can be used, or one can be turned on the lathe. If a pill box is used two wooden lugs must be glued to the bottom of the box to hold the screws by which the cap is fastened. If the box is lathe-turned the sides can be made thick enough for the screws. The cap is made of thin wood, hard rubber, or hard fiber, cut to fit the box and having a hole about half an inch in diameter in the center. It must have a thin rim or collar to separate it from the disk. The disk is made of thin, soft iron, such as photographers use for tintypes, and this must be of the thinnest variety. The magnet is made of a piece of steel rod three-eighths of an inch in diameter and four and one-quarter inches long. If soft steel is used, it can be hardened by heating it red hot and then plunging it into cold water. The steel rod can be magnetized at the nearest electric light plant, where the dynamo tender will no doubt be willing to hold it for a few minutes against the field magnet of one of the large dynamos. The parts described, when put together, appear as in the illustration on page 5738, which represents the receiver as if it were sawed through lengthwise from end to end. In addition to the two receivers, two electric bells, two switches, two push buttons, and four dry cells are needed. These are connected as in the illustration on next page. Care must be taken to connect the dry cells in series, otherwise one battery will neutralize the effect of the other. The push buttons are for the purpose of ringing the bells, the switches for making the proper connections for ringing and talking. It will be well to set up both sets in one room and experiment with the switches and push buttons to learn how to make the proper connections before setting up the line between two houses, as corrections are then more easily made.

Power Required for a Telephone. The power required to operate a telephone is very small. The telephone receiver is more sensitive to an electric current, that is, it responds to a weaker current, than any other instrument in common use. The power required to ring an electric doorbell would keep millions of telephone receivers buzzing for an equal length of time. Many times as much power is required for the ringing of the telephone bell as for operating the talking circuit.

Automatic Telephone. This is a system of telephony which requires no operator at the switchboard. A system of electromagnets at the central station makes the connections. The devices for making connections, called selectors and connectors, not only select the number called for but make a busy test, ring the signal at the called station and complete the circuit of a talking current. The talking and ringing circuits are essentially the same as in the switchboard telephone.

The number is called by means of a dial. The caller's finger is inserted in the hole over the first figure, and the dial is rotated until the finger comes to the finger stop. Then the dial is released and springs back. Then the



ARRANGEMENT OF TELEPHONE LINES
Two boys can construct a simple line with two telephones, making connections as shown above.

second figure is taken in the same way, and so on until all the figures of the required number are taken. The dial is connected to a wheel with ten teeth, to correspond to the ten figures on the dial. When the dial is turned to the tenth figure, the wheel by means of its teeth makes and breaks the circuit ten times. This electromagnet is in the selector which takes the place of a switchboard. Two electromagnets in the selector, both operated by the turning of the dial, make the connections. There are in the selector one hundred contacts, ten rows of ten contacts each, arranged in a semicircular bank. Each contact consists of a free tongue or strip projecting inward toward the center of the curve. A vertical rod at the center carries two springs which can sweep over and under the contact strips, the two springs clasping a strip and making a firm contact. These two springs are called a "wiper." By raising the rod and turning it, the wiper can be made to connect with any one of the 100 contact strips. The use of the electromagnets is to raise and turn the rod to the position required to connect with the number desired. On the rod is a row of ratchet teeth, and the armature of the electromagnet operates a pawl which turns the ratchet wheel. Each time the circuit is closed the electromagnet pulls up its armature and lifts the rod one notch. When the circuit is broken the armature drops, and the pawl catches the next notch, the rod being prevented from slipping back by a "dog."

The first figure of the number called determines the number of notches the rod is raised. For example, if 5 is the first figure, the dial is first turned from 5 to the finger stop. This gives five impulses to the electromagnet armature, raising the rod five notches, and raising the wiper to the fifth row of contacts. Another electromagnet acting horizontally turns the rod on its axis by means of a pawl and a set of teeth arranged in a circle around the rod. For example, if 6 is the second figure, six impulses are given to the horizontal magnet, turning the rod six notches and connecting the wiper with the sixth contact. Connection is then made with the number 56. For an exchange of not more than a hundred subscribers one selector for each subscriber makes all the connections. If there are more than 100 and not more than 10,000 subscribers, additional sets of selectors must be used. The first selector acts as a connector, and connects the subscriber to a certain selector in another group of 100 selectors. This selector then completes the connection as desired. In this case there are four figures in the number called.

Some Special Applications of the Telephone. The electrophone is a telephone specially arranged to enable subscribers to listen to performances in theaters, concert halls, etc. A special transmitter more sensitive than the ordinary is used. A number of subscribers may be connected to the same transmitter.

The telephone fire alarm has the advantage over other fire alarm systems in that it not only rings in an alarm signal, but enables the person sending in the alarm to give particulars to the officials.

In war the telephone is used to keep the commander-in-chief in touch with every portion of the army. The line wires are usually of thin, bare, copper wire wound on a reel, one man letting out the wire as he rides along, another following and by means of hooked rods lifting the wire to branches of trees for insulation. The earth is used for the return circuit. A metal rod at each end of the line is driven into the damp ground or into living trees where the sap makes the connection. A buzzer is used for signaling, and the Morse code is commonly used, as such signals are

transmitted more accurately than the sounds of the voice. The complete set is made very light and compact. On a war vessel the commander is in telephonic communication with every part of the ship. The instruments are made very substantial, to withstand the shocks to which they are subjected, some being bullet proof.

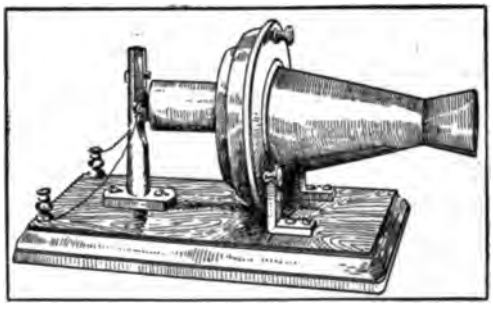
The helmets of divers are fitted with transmitters so that the diver is in communication with the boat above.

For railway service a telegraph line may be made to serve as a telephone line. The telephone is extensively used in train dispatching, its advantage over the telegraph being greater speed and the fact that it does not require a trained telegraph operator to serve as train dispatcher. Telephone sets are installed at sidings, crossings, water tanks and other similar places so that a train crew may, in case of emergency, communicate quickly with the train dispatcher. Many railroads, in addition to the dispatching circuit, install also a message circuit and frequently a block line for communication with the operators of interlocking switches and block signals.

Another important branch of the telephone industry is the private exchange, in reality a telephone system under private control. Some private exchanges possess more telephones on their lines than are required to care for the business of cities of considerable size. Every large business house has its own private exchange for communication between the various departments of the house. As a rule these private exchanges also connect with the public exchange so that any department may make either a local city call or a long-distance call through the private exchange, just as over an ordinary telephone. E.E.B.

Brief History of the Telephone

Soon after the invention of the Morse telegraph, the idea of "talking by telegraph" began to grow in the minds of inventors. The outgrowth of this idea was the modern telephone. The telephone which was first patented and first exhibited to the public was that of Alexander Graham Bell. His patent, dated March 7, 1876, was for "certain new and useful improvements in telegraphy." One of these "improvements" was "the method of transmitting vocal and other sounds by telegraphy." In the Bell telephone the transmitter and the receiver were constructed on the same principle as the receiver of the modern telephone. Each receiver had a piece of parchment tightly stretched over a circular frame and a piece of soft iron fastened to the center of the parchment. An electromagnet within the frame was placed with one end near, but not touching, the parchment.



THE FIRST BELL TELEPHONE

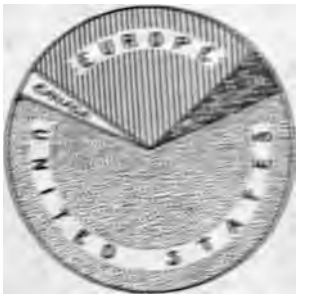
The Bell telephone was first exhibited to the public at the Centennial Exposition in Philadelphia in 1876, and the new invention was received with incredulity and ridicule. Bell was called "a crank who says he can talk through a wire." He had to prove the worth of his invention. To do this he borrowed a telegraph line in Boston, having a length of two miles, and with a friend held a conversation over the wire, the first sustained conversation by telephone, and the report of this conversation was published in a Boston newspaper. Soon after this Bell lectured in Salem, and a report of the lecture was sent by telephone to the Boston *Globe,* the first news transmitted by telephone. This aroused public interest, and in the following year (1877) the telephone business made a beginning.

In May, 1877, a young man named Holmes, who installed burglar alarms in business houses in Boston, borrowed five telephones and set them up in five banks, connecting them to the wires of the burglar alarm. The five telephones could be connected by a switch in Holmes' office. This was the first telephone exchange; it was a crude affair compared with a modern exchange. In the same month a man named Emery leased two telephones, paying twenty dollars, the first money transaction in the telephone business. From this small beginning the business grew until, in August, 1877, there were 778 telephones in use. But this was insignificant for such an important invention as

the telephone. Capital could not be secured to develop the business. Bell had associated with him two men, Thomas Sanders and Warren Fay, to assist in their development. The Western Union Telegraph Company came out in opposition to Bell, claiming that it was the original inventor of the telephone and formed a company under the name of the American Speaking-Telephone Company was prepared to supply telephone instruments at a low rental. The result was a victory for Bell, who gained a monopoly of the telephone in such an extent that anyone wishing to use it in Bell, and the number of telephones and were using telephones at the rate of a thousand a month.

In 1878 the Bell Telephone Company was organized under the management of Theodore N. Vail, with a capital of $850,000. But the battle was not over. The Western Union Telegraph Company owned the Edison transmitter, while the Bell Company had only the Bell receiver, which served as both receiver and transmitter. At this juncture Francis Blake came to the Bell Company with a transmitter of his own invention which he offered to sell for stock. His offer was accepted, and the Blake transmitter, proving superior to the Edison, gave the Bell Company the advantage it needed. The Western Union next attacked the legality of the Bell patents. The fight, which continued for eleven years and comprised six hundred lawsuits, was decided in Bell's favor. This was the end of the difficulties. Bell stock jumped to fabulous prices. By 1898 the company had installed its first million telephones. No large has the telephone business become that the Bell patent is recognized as the most valuable patent ever issued in any country.

Present Extent of Telephone Service. *In the United States.* Nowhere else in the world has the telephone industry grown as rapidly as in the United States. Comparisons show that while in England there is one telephone for every 100 people there are ten telephones for the same number in the United States. Chicago has more telephones in proportion to population than any other city in the world, there being one for every six people. New York City averages about one instrument for every ten people. While farms in England are practically without telephone connection there is in the United States approximately a rural telephone for every two farms. Each telephone in the great Bell System in the United States represents an investment of $[illegible] and the gross revenue from it is $[illegible]. The total telephone investment in all countries in 1914 was $[illegible] and there were [illegible] miles of wire.



THE WORLD'S TELEPHONES

Nearly two-thirds of the number of telephones in the world are in service in the United States.

Of this total the United States had [illegible] and Canada [illegible] miles.

In the American Union there are [illegible] miles of wire sufficient to build a highway around California while the wire on which [illegible] messages a year are sent are transmitted. If a single line would reach [illegible] miles around the world. Of the [illegible] telephones in use [illegible] are owned by the American Bell Company and [illegible] belong to independent companies.

In Canada. In Alberta, Manitoba and Saskatchewan are telephone systems owned by the provincial governments. In the entire Dominion in 1914 there were thirty-five municipal exchanges, 368 stock companies, 133 co-operative companies, thirty-one owned in partnership and 113 in the hands of private individuals, a total of 680 telephone companies in the Dominion. There are in all [illegible] telephones in use, for the maintenance of which [illegible] miles of wire are required. The cost of the entire property and equipment of Canadian telephone companies is approximately $[illegible]. The diagram in this article shows the proportion of telephones in Canada to those in use in the entire world. E.E.B.

Consult Wilder's *Telephone Principles and Practice*; Gibson's *How Telegraphs and Telephones Work*.

TELEPHONE, Wireless. See Wireless Telephone.

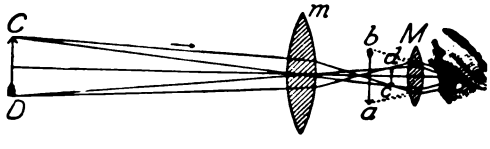
TELESCOPE, *tel'e skohp,* a long tube having an arrangement of lenses, used for viewing distant objects like the stars. It was the telescope that gave to man an idea of the vastness of the universe and of the smallness of his own world, floating like a grain of sand in the immensity of space. It overthrew existing notions of man's destiny and importance in the scheme of things and forced him to shape a new philosophy. In fact, the revolution wrought by

the telescope was so great that it can hardly be exaggerated.

The transforming power of the telescope on man's thinking was shown from the very invention of the instrument in the seventeenth century. Though he was not the original inventor, Galileo is given credit for bringing out the first practical instrument. His first telescope was a crude affair, and the best one he was able to devise before his death magnified but thirty times. Nevertheless, he was able to discern four of the satellites of Jupiter and to discover characteristics of the sun, the moon and other heavenly bodies that had not been known before.

Under the action of a powerful lens, the summer heavens are transformed, and they swarm with countless glittering points of light. The naked eye may see between two thousand and three thousand of these stars or suns; the telescope reveals a multitude that has been estimated at a hundred million. This great number is of course only an estimate, but patient astronomers have charted about 600,000. Stars that seem single to the unaided vision are split up by the telescope into two or three stars turning about one another in space. The Milky Way, which makes but a luminous patch across the sky, is dissolved into countless multitudes of distinct stars. Among the seven chief stars of the Pleiades the telescope shows a star cluster in which 2,326 stars have been counted.

Structure. The essential parts of a telescope are an *objective* (also called *object glass* and *object lens*) for the formation of an image of the object under observation, and an *eyepiece* for magnifying the image. These parts are set in



PRINCIPLE OF THE TELESCOPE
Explanation appears in text.

a tube so constructed that the observer can lengthen or shorten the distance between them. Astronomical telescopes are of two types, refracting and reflecting. In refractors the objective is a large convex lens of long focus, and the eyepiece a convex lens of short focus. In reflectors the object glass is a concave mirror which reflects the rays of light to a focus.

The accompanying diagram shows the principle of the astronomical refractor. The object viewed is marked *CD; m* is the objective, and it forms an inverted image *cd*. This is viewed through the eyepiece *M*, which produces a magnified image, *ab*, of the first image. The first image, *cd*, is as much smaller than the magnified image, *ab*, as the focal distance of the eyepiece is smaller than that of the objective. The objective has to be made large in order to collect enough light to permit considerable magnifying of the image without too much loss of distinctness.

Terrestrial telescopes, which are constructed for viewing objects on the earth, have two double-convex lenses between the eyepiece and the objective, and as the rays diverge from the inverted image they cross and form an erect, magnified image. The inversion of the image which takes place in astronomical instruments does not interfere with the accuracy of observations made by the astronomer.

Great Modern Telescopes. The largest refracting telescope in the world is that in the Yerkes Observatory, on the north shore of Lake Geneva, Wisconsin. It is the property of the University of Chicago. The object lens has an aperture of forty inches and weighs about 760 pounds. The tube is sixty-two feet in length, has a weight of six tons, and is mounted upon a massive cast-iron column, which rests upon a solid concrete foundation. Clockwork located in an upper section of the column drives the mechanism. The apparatus occupies a dome ninety feet in diameter, which has a rising floor seventy-five feet across. This floor moves through a range of twenty-three feet between two balconies, and is close to the lowest point when the observer is viewing a star near the zenith (see YERKES OBSERVATORY). Second only to the Yerkes refractor is the thirty-six-inch telescope of the Lick Observatory at Mount Hamilton, California (see page 3406).

The great reflecting telescope of Lord Rosse, at Birr Castle, in Ireland, was for a long time the largest of its kind in the world. Since 1914 it has been a possession of the South Kensington Museum of Science. The reflecting mirror of this instrument is six feet across, but the telescope is surpassed in size by those of Mount Wilson Solar Observatory (8 feet, 4 inches) and the Dominion Observatory, near Victoria, British Columbia (6 feet, 1 inch). Other notable reflectors are those at Harvard University, Melbourne and Paris. The telescope at Harvard, which has a mirror five feet across, has been used with remarkable success in photographing the stars. How telescopes are used in photography is told in the article ASTRONOMY. G.B.D.

Consult Clerke's *History of Astronomy;* Lockyer's *Star-Gazing, Past and Present.*

TELL, WILLIAM, a legendary hero of Switzerland, whose story, though perhaps not historically accurate, typifies the spirit that gave the land its freedom. According to the legend, Tell was a peasant of Uri, one of the Forest

TELL STATUE
At Altdorf, Switzerland.

Cantons. In 1307, when the country lay restive under the oppressive rule of the Austrians, he appeared one day in the market place of Altdorf. Here, on top of a pole, the Austrian bailiff Gessler had set up a cap to which he commanded all Swiss to do homage. Tell refused to humble himself, and was told that he would be put to death unless he could save himself by shooting an apple from the head of his little son. This harrowing feat he accomplished, but when he confessed that a second arrow in his quiver was intended for the heart of Gessler, should the first not hit the mark but should kill his son, he was seized and placed in chains. While he was being carried across a lake in the tyrant's boat a great storm arose. In fear of his life Gessler ordered the prisoner unbound, that he might help guide the boat. Tell, when his chains were loosed, sprang ashore, and soon sent an arrow into the heart of his persecutor. The story then connects itself with the revolt of the Forest Cantons, in which Tell is given a conspicuous part. This popular tale is the basis of Schiller's drama *Wilhelm Tell* and of an opera by Rossini.

Consult Schmidt's *William Tell,* translation by Upton; Marshall's *Stories of William Tell and His Friends.*

TEM'PE, VALE OF, a beautiful valley in Thessaly, between Mount Olympus and Mount Ossa. It is about four and a half miles in length, with many beautiful glades and openings into the precipitous sides of the mountains. The river Peneus, now called the Salambria, flows through it. In mythology the Vale of Tempe is noted as one of the favorite haunts of Apollo, and through all time it has been praised in song and verse.

TEMPERANCE, *tem'per ans,* a term which signifies moderation in the exercise of the functions and privileges of life. "Let your moderation be known unto all men," is one of the oft-quoted teachings of the Apostle Paul. Moderation in eating and drinking, in the enjoyment of pleasures, in the expression of opinion, in work and in play is good for all. Society has found it necessary to make many of its laws not for its moderate members but for those who know no moderation; so it is sometimes necessary to deny a people a privilege which would be harmless if moderately enjoyed. Restrictive laws in regard to personal conduct would not be necessary if every one were temperate in all his actions.

In the nineteenth century temperance came to have a special meaning, referring to the use of alcoholic beverages. In fact, it came to mean not moderation, but *total abstinence.* Nowadays when the temperance movement is spoken of one thinks instinctively of the spread of prohibition. The progress made by this movement is summarized in these volumes in the article PROHIBITION.

Consult Towns' *Habits That Handicap.*

Related Subjects. In connection with the general subject of temperance the following articles may be consulted:

Alcoholic Drinks	Prohibition
Anti-Saloon League	Prohibition Party
Good Templars	Woman's Christian Temperance Union
License	
Local Option	

TEMPERATURE, *tem'per ature.* In physics *temperature* is a term used to describe the state of a body with reference to its ability to communicate heat to other bodies. When two bodies are brought into contact and one transfers heat to the other, it is evident that the

one receiving heat has a lower temperature than the other. Temperature is measured by the thermometer, an instrument having a graduated scale of degrees between two fixed points, the freezing point and the boiling point. There are in general use two scales, Centigrade (C.) and Fahrenheit (F.), the former having the freezing point at zero (0°) and the latter 32° above zero. The boiling points are respectively 100° and 212°. In theory there is a point at which the vibrations constituting heat cease, and this point (273° below Centigrade zero) is known as the *absolute zero of temperature.* In practice this point has never been reached, but it is used as a convenient standard in scientific calculations. In physical geography temperature refers to atmospheric conditions in various localities.

Related Subjects. In connection with this brief discussion on temperature the reader may consult the following articles in these volumes:

Centigrade	Thermometer
Climate	Weather Bureau
Heat	Zone

TEM'PERING, the process of imparting to metals, principally iron and steel, a required degree of hardness. In industry the term is now almost exclusively restricted to hardening steel. Numerous methods of tempering are in use, but all depend upon the same principle—heating and cooling the metal. When iron or steel is heated red hot and suddenly cooled in water it becomes hard and brittle. Cast iron is cooled so rapidly in the molds that it is brittle. On the other hand, if allowed to cool slowly, the iron or steel becomes soft and flexible. Red-hot steel rods, when allowed to cool slowly in the air, can be bent into any desired form and are easily cut with a file or metal saw. Between these extremes there are many degrees of hardness, each adapting the article to the special use for which it was designed.

To secure the requisite temper of a fine tool requires skill and experience. To illustrate, in tempering razors the blade is forged, and when it is red hot the edge is dipped in water for a moment to the depth of a half inch, then withdrawn and quickly polished on an emery belt. This part of the blade becomes heated from the thicker part that was not immersed in the water. As the temperature rises the polished surface changes color. By experience the workman knows from the color when the required temperature is reached. He then plunges the blade into water.

The colors and the tools to which they apply are:

Pale yellow (about 430° F.); hammer faces, planer tools, engravers' tools.

Straw yellow (about 460° F.); dies, drills, punches, etc.

Brown yellow (about 500° F.); plane irons, gouges, twist drills and coopers' tools.

Light purple (about 530° F.); surgical instruments, augers, cold chisels.

Dark purple (about 550° F.); axes, springs, saws, screw drivers and needles.

TEM'PLARS, KNIGHTS, a military and religious organization founded at Jerusalem in 1118 or 1119. Nine French knights organized it and bound themselves by vows of obedience, poverty and chastity, and took as their special work the protection of the Holy Sepulcher and the defense of pilgrims to the sacred spots. The society grew rapidly in numbers, though only nobles or knights were at first admitted, and its power increased rapidly. Though individuals were pledged to poverty, the order as a whole had no such obligations, and along with the special privileges granted it by the Pope and various European rulers it acquired many rich land holdings. At the height of its power it is said to have possessed no fewer than 9,000 manors throughout Europe. Secular priests were admitted to forward the specifically religious purposes and subordinate members for the menial tasks, while the knights proper gave all their time to fighting.

At this they acquitted themselves splendidly, and much of the history of what was most effective in the Crusades is but a history of the Templars. Their personal bravery was remarkable, and during the long attempt to hold Jerusalem for Christianity over 20,000 of them met death on the field. The Latin kings of Jerusalem gave them quarters in the palace, which was built on the site of Solomon's Temple; from this fact, the knights took their name. Fighting side by side with them when the struggle with the infidels was fiercest, and opposing them in bitterest rivalry when conditions were less compelling, was the other great military and religious order, the Knights Hospitalers of Saint John.

The kings of Europe, impoverished in many instances by the Crusades, looked with envy upon the possessions of the Templars and decided to gain them for themselves. King Philip IV of France and Pope Clement V were the leaders of this opposition, which in 1307 culminated in the death by torture of the grand master and many knights and the disbanding

of the order in most countries. Crimes of all sorts were laid at the door of the order to give a semblance of justice to the procedure, but it is certain that while individual members in many cases doubtless deserved all the censure brought against them, the society as a whole had not become degenerate in its aims and methods. Such of the property as was not seized by the sovereigns was turned over to the rival order, the Hospitalers.

Modern Knights Templars. One of the degrees in Free Masonry is that of Knight Templar, and to attain this rank, which is one of the highest in the Order, one must first be a Master Mason and Royal Arch Mason. See MASONRY. A.MC C.

TEMPLE, *tem'p'l,* the center of Jewish worship from the time of Solomon to the destruction of Jerusalem by the Romans. The site, on the hill of Zion, was chosen by David, who also gathered the materials for the first, or Solomon's Temple. The walls of this structure, sixty cubits long (a cubit was eighteen inches), twenty wide and thirty high, were of stone, hewn and polished at the quarries, so that there was no sound of hammer or tool of iron in the building (*I Kings* VI, 7). The whole edifice, inside and out, was covered with costly woods, overlaid with gold. Within were the Holy of Holies, containing the Ark of the Covenant, and the holy place, containing the altar of incense, the table of shewbread and the golden candlestick. In front was a porch, ten cubits wide, with an imposing pillar on either side of the entrance. Surrounding the building on three sides were corridors and cells, rising three stories in height. The Temple faced the east, and before it stood the brazen altar of burnt offering.

The magnificence of Solomon's Temple, its impressive priesthood and its costly sacrifices centralized the worship of the people, and other places of worship disappeared. It was destroyed by Nebuchadnezzar, in B. C. 586. Zerubabel's temple, erected after the Exile, was far less splendid than Solomon's. In it the Holy of Holies was empty, the Ark having been lost at the time of the captivity. This temple was replaced (19 B. C. to 64 A. D.) by the costly temple of Herod, in which Jesus walked and taught, and which, in its turn, was destroyed by the Romans in A. D. 70.

TEMPLE, TEX., a trade center in Bell County, in the east-central part of the state, 178 miles northeast of San Antonio. It was founded in 1881 by the Gulf, Colorado & Santa Fe Railroad, which established and maintains here extensive car shops and a large hospital. The Missouri, Kansas & Texas Railroad also enters the city, and there is electric service to Belton, the county seat. Temple contains a Federal building, a Carnegie Library, the Temple Sanitarium and the King's Daughters' State Hospital. In addition to car shops, the city has cottonseed-oil mills, a candy factory and flour mills, and there is an important export trade in cotton, grains and live stock. The city was chartered in 1884. Population in 1910, 10,995; in 1916, 13,504 (Federal estimate).

TEM'PO, a musical term meaning *time,* derived from the Italian, and expressing the rate of movement in which a musical composition is to be played. The degrees of time are divided into two classes—those which suggest the rate of movement, such as *lento* (slow), *adagio* (gentle), *moderato* (moderately), *presto* (quick), etc., and those which represent a quality which may influence the time, such as *vivace* (lively), *animato* (cheerful). See MUSIC, subhead *Tempo,* and table on page 4026.

TENACITY, *te nas'i ti,* a property possessed by all matter. It is the resistance which substances make to being pulled or torn apart, and depends upon the material, the shape of the body, the temperature and the length of time the weight is applied. Tenacity is measured in terms of the weight necessary to break the body. Hollow bodies have greater relative resistance than have solids. The bones of animals, the quills of bird feathers, bamboo cane and cornstalks are illustrations. A cable of many wires woven together is much stronger than a solid rod of the same size and material, because the sum of the tenacities of the wires is greater than that of the rod. Among the metals, cast steel has the greatest tenacity, and lead is among the weakest in this respect. See MATTER; STRENGTH OF MATERIALS.

TEN'ANT, a term derived from the Latin word *teneo,* meaning *I hold,* signifying one who has temporary use and occupation of lands or buildings belonging to another. The terms and period of time for which the property is held are defined in a written agreement which is signed by the owner, or landlord, and by the tenant. This document is known as a *lease.*

The relation of landlord and tenant had its origin in the feudal system of the Middle Ages, and some of the feudal obligations of both the lessor and lessee still survive in the present laws. The landlord must defend his

tenant's title, while the latter may not sublease the property or any part of it without the consent of the landlord. The tenant is usually responsible for repairs made necessary by the misuse of the premises, but specific agreements in regard to repairs are usually included in the lease. If the buildings are rendered untenantable by fire the landlord may terminate the lease, or if he does not make repairs within thirty days the lease ceases to be binding.

If the tenant fails to pay the stipulated rent or does not keep other terms of the lease, the landlord or his representatives may terminate the lease and may legally enter the premises, expel the tenant and remove his goods. The lessor also has a lien upon the household goods of the tenant as security for rent. He may sue for any rent that may be due by the terms of the lease, and the tenant is responsible for the attorney's fees and other costs. The heirs, successors or administrators of both tenant and landlord are bound by the terms of the lease.

A *tenant at will* is one who occupies property for an indefinite period, which may be ended at any time desired by either landlord or tenant. The latter is entitled to a notice of removal, generally sixty days before the day ending the term of occupancy. If he has growing crops on the rented land, he may enter later and gather them.

A *tenant at suffrance* is one who occupies property without the expressed consent of the owner or after his term of possession has expired. He may be ejected at any time by the landlord.

Related Subjects. The reader is referred to the following articles in these volumes:

Contract	Lease
Law	Real Estate

TEN'DER, a term in law relating to payment of debt. See LEGAL TENDER.

TENDONS, *ten'dunz,* or **SINEWS,** *sin'uze,* strong, fibrous cords which attach the muscles to the bones. They may be round, or long and flat, and are composed of close, tough, parallel fibers. The tapering end of each muscle merges directly into one end of a tendon, the other end of which is attached to the bone in a distinct groove in the bone substance. At this extremity, too, the tendons are firmly imbedded in the periosteum, or protective sheath which encases the bones. It is by means of the tendons that the movements of the muscles are transmitted to the bones. See MUSCLES.

TEN'EMENT, a name applied to any house constructed for the occupancy of two or more families, the legal definition as to the number of families varying somewhat in different cities. The word is derived from the Latin *tenementum,* meaning *a holding,* and as popularly (though not legally) considered is restricted to houses occupied by the poorer classes of city dwellers. All large municipalities are confronted by the tenement-house problem; the movement to better housing conditions is engaging the attention of city governments and social workers everywhere.

Tenement-House Regulation. The chief subjects of tenement-house regulation are light and ventilation, protection against fire, water supply, sanitary standards and overcrowding. Because of laxity in regard to building regulations, many cities have permitted certain sections to decline into so-called slum districts. Old houses in such districts, from which the better classes have withdrawn, have been converted into tenements, and new ones have been erected with no regard for the health and safety of the occupants. Large families are crowded into small, dark, ill-smelling rooms, which become centers not only of disease but of crime. A deplorable number of young people and children learn vicious habits in such homes because there is no adequate provision for privacy, while lack of light, air and sanitation lowers the health standards, brings about epidemics and causes an excessive death rate among babies.

Such conditions as these, which Jacob A. Riis describes so graphically in his *How the Other Half Lives,* are responsible for the movement to better the lot of the tenement people. In New York City the problem has been attacked by the state legislature, but usually building and housing regulations are passed by city ordinances. The remedies include the tearing down or improvement of existing tenements, and the building of new ones according to specified rules. Health boards, sanitary inspectors, building commissions and the like are appointed to see that the laws are obeyed.

Consult "Slums of the Great Cities," in *Seventh Annual Report* of the United States Commissioner of Labor; "Improved Housing," in *Bulletin No. 6* of the New York School of Philanthropy.

TENERIFFE, *ten er if',* the largest of the Canary Islands (which see).

TENIERS, in English, *ten'yerz,* the family name of two noted Flemish painters, father and son, both of whom excelled in the portrayal of scenes from everyday life.

David Teniers, THE ELDER (1582-1649), was born at Antwerp. He was a pupil of Rubens. His paintings, especially those presenting rustic games and weddings, are noted for their fidelity to nature, their charm of color treatment and excellence of composition. They include *Peasants Carousing in Front of a Tavern, A Dutch Kitchen,* now in the Metropolitan Museum, New York, and *Playing at Bowls.*

David Teniers, THE YOUNGER (1610-1690), who excelled in all the qualities that characterized his father's work, was called "the prince of genre painting." He often introduced cats or monkeys into his small canvases, all active and picturesque, although his best works are those with the fewest figures. The younger Teniers was born at Antwerp and received his first art instructions from his father. He arose quickly in popular favor, and won the patronage of leading noblemen of his country. In 1650 he took up his residence at Brussels as court painter, where he remained for the rest of his life. Few artists equaled him in the charm with which he depicted open-air life. Often he would participate in the merrymakings so as to obtain an intimate picture of the people whose lives he has perpetuated in hundreds of paintings distributed among the great galleries of Europe. Among his canvases are *A Merry Repast, Peasants' Dance, The Barber Shop* and *Marriage Festival,* now in the Metropolitan Museum, New York City.

TENNESSEE, *ten eh see'*, one of the south-central states of the American Union, popularly known as the BIG BEND STATE, because of the great loop which the Tennessee River describes across the state.

Size and Location. Tennessee has more states touching its borders than any other state of the Union except Missouri. The Mississippi River is its western boundary, and separates it from portions of Arkansas and Missouri. The greater part of its straight northern border line adjoins Kentucky, with a small stretch at the eastern end meeting the Virginia line. Mississippi, Alabama and Georgia touch it on the south, while the state of North Carolina bounds it on the east. Having an area of 42,022 square miles, of which 335 square miles are water, it ranks thirty-fourth in size among the states. Its area is nearly equal to that of the state of Virginia, and it is 982 square miles in excess of the area of Ohio.

People. Although much of the state is mountainous and there are comparatively few large cities, Tennessee is thickly settled, and ranks seventeenth among the states in population. In 1910 the inhabitants numbered 2,184,789, of whom 473,088 were negroes and 18,459 were of foreign birth, chiefly German, Russian, Irish, English and Italian. The average density of the population was 52.4 per square mile, over one and one-third times the average for the United States. Only 18.2 per cent of the inhabitants lived in cities and towns, the largest of which are Memphis; Nashville, the capital; Chattanooga, Knoxville, Jackson and Johnson City, all having a population of over 10,000. On January 1, 1917, the population was estimated to be 2,296,316.

The Baptist Church has the largest number of members, followed by the Methodist, Presbyterian, Disciples of Christ and Roman Catholic denominations.

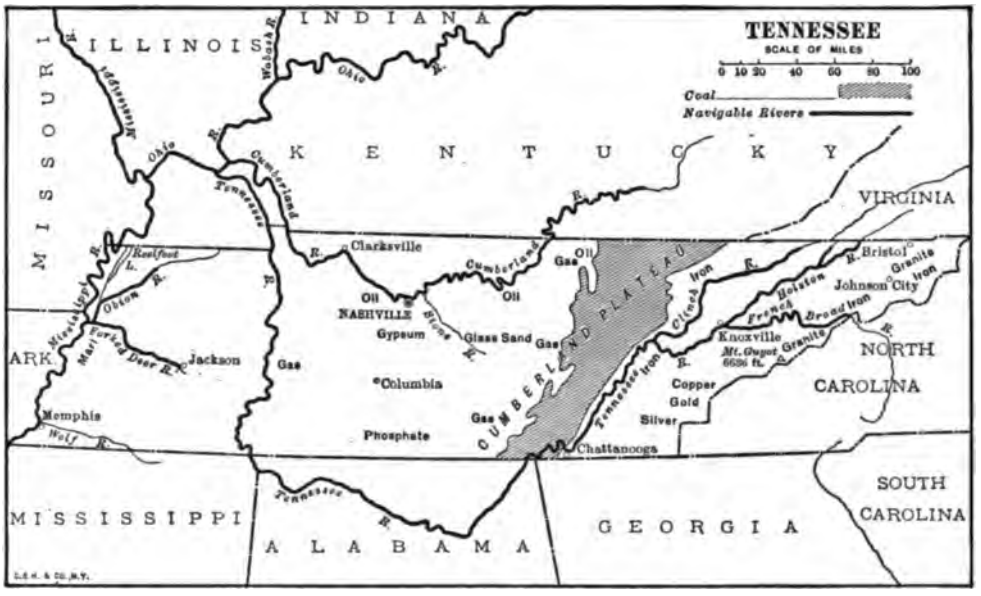
Education. Public schools are administered by county boards of education, supervised by a state board consisting of the governor, state superintendent of public instruction and six other members. In addition to the regular school fund, derived from county taxation, the interest on the permanent state fund and twenty-five per cent of the gross revenue of the state, the schools have the use of all money in the state treasury on January 1 of each year, which is about $250,000.

There are separate schools for white and colored pupils, and one or more high schools are maintained in each county. In several counties education was compulsory before 1914, and in that year compulsory education was made state-

wide. Over one-half of the total school population is enrolled in schools, and illiteracy is steadily decreasing. Advancement has been made in the education of the secluded eastern mountaineers, who formerly were cut off from such advantages.

The state maintains a normal school in each of four educational districts of the state and a university at Knoxville. The George Peabody College for Teachers receives state aid (see PEABODY EDUCATION FUND). There are many private and denominational institutions for higher education, including the University of Chattanooga at Chattanooga; Vanderbilt University at Nashville; Carson and Newman College at Nashville, Knoxville and Bolivar; an institute for the blind at Nashville; a school for the deaf and dumb at Knoxville; a Confederate soldiers' home near Nashville, on "The Hermitage," formerly the home of Andrew Jackson; a reform school for boys in Davidson County; an industrial school and a penitentiary at Nashville. There are also county almshouses and asylums and many private institutions of charity.

The Land. Tennessee is a series of rocky heights and deep valleys, hills and dales, and broad and rolling fields, with elevations ranging from the loftiest mountains of the Appalachian system to the marshy bottom lands along the Mississippi River. The Unaka, or



OUTLINE MAP OF TENNESSEE

Showing the boundaries, navigable rivers, chief cities, locations of mineral wealth, and the highest point of land in the state.

Jefferson City; Cumberland University at Lebanon; the University of the South at Sewanee, and Christian Brothers at Memphis. Prominent schools for the colored are Fisk University, Roger Williams University and Walden University at Nashville; Le Moyne Normal Institute at Memphis, and Knoxville College at Knoxville. Montgomery Bell, an academy for boys, and Ward-Belmont, Boscobel and Saint Cecilia's seminaries for girls are well known schools at Nashville.

The charitable and penal institutions are controlled by boards of trustees under the general supervision of a state board of charities, consisting of the governor and six other members. There are state hospitals for the insane near

Great Smoky Range, in which there are sixteen peaks rising above 6,000 feet, forms the eastern border of the state with North Carolina. In this rugged, shaggy wilderness, Mount Guyot, the highest peak in the state, rises 6,636 feet, and there are several others nearly as high.

The valley of the Eastern Tennessee, a sea of wavelike ridges of rich land, lies between these mountains and the Cumberland table-land, which forms a rampart of rocky cliffs 1,000 feet above the valley. This section is cut by the deep, fertile Sequatchie Valley, and contains several detached mountains, Lookout Mountain being among them. The jagged spurs of the Cumberland Plateau project on the west into the sandy "Highlands." These form a highland

rim surrounding a great basin which resembles a drained lake and is the finest agricultural region of the state.

In the western section, the blue-grass region of the state, are the irregular valleys of the Tennessee and Cumberland rivers, sloping towards the Mississippi River and divided from the bottom lands by a ridge of cliffs. The lowland and the "Bottoms" are dotted with lakes, marshes and patches of dark, forested swamps.

Rivers and Lakes. The Mississippi, Tennessee and Cumberland rivers form the great drainage system of the state. The Tennessee, the longest tributary of the Ohio, crosses the state twice; with its tributaries it drains most of the state, and furnishes many miles of navigable waterway. The Cumberland, another affluent of the Ohio, is the most important river commercially. Winding through a region of great undeveloped coal fields, it promises to be one of the country's great highways for coal traffic. A number of small rivers drain the extreme western section into the Mississippi.

There are few lakes of any size, the largest being Reelfoot, a marshy lake near the Mississippi, in the northwestern part of the state.

Climate. Except on the mountain heights and in the bottom lands, the climate of Tennessee is mild and delightful. However, great variation occurs, because of the diversity of elevation. On the banks of the Mississippi the climate is like that of Upper Louisiana, while in the lofty mountains the average temperature is equal to that of Montreal. The state is in the same latitude as Northern Africa and Southern Italy, but the lack of moderating sea winds makes the Tennessee summers hotter and the winters colder. The average annual temperature ranges from 62° in the Mississippi lowlands to 45° in the Unaka Mountains. The annual precipitation is fifty inches, the rainfall being heaviest in late winter and early spring.

Sources of the State's Wealth

Agriculture. Tennessee is an agricultural state. Over three-fourths of the area of the state is in farms; and about sixty per cent of the population is engaged in agriculture. The central basin and western and northeastern parts of the state are the important agricultural sections, and large quantities of Indian corn, cotton, hay and forage, wheat, tobacco, oats, sorghum, peanuts, fruits and vegetables are grown. In average years Tennessee ranks eleventh among the states in the production of corn, its chief crop, fourth in the tobacco output, and tenth in its cotton production. Truck farming is extensive, and large shipments of fruits and vegetables are sent to Northern markets. The raising of live stock is important, and Tennessee ranks high in the breeding of fine horses, cattle and sheep. In 1915 Tennessee ranked twenty-first among the states in the total value of agricultural products.

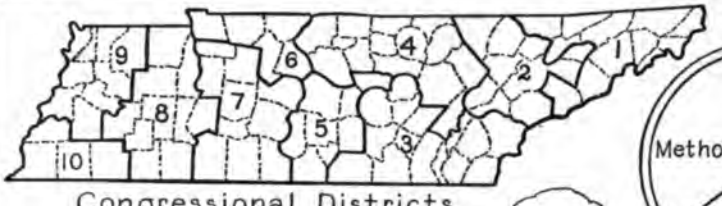
Forests. The state was originally covered with heavy forests, and one-half of its area still is woodland. One hundred forty varieties of timber are grown, but white oak embraces two-thirds of the entire stand. There is no state appropriation for forest fire protection, but a fire warden system has been organized.

Minerals. Coal is the most important mineral product of the state. In the Cumberland table-land the fields of bituminous and semi-bituminous coal cover 4,400 square miles. With a normal output valued at about $8,000,000, Tennessee ranks thirteenth among the states in the production of coal, and holds about the same place in the output of coke. Iron ores are found in forty-four counties of the state in workable quantities, and Tennessee usually ranks ninth in the production of this metal. The state also ranks high in copper production, in its by-product, sulphuric acid, and in zinc. Deposits of stratified phosphate rock cover seventy-five square miles in the western portion of the highlands and central basin, and Tennessee is surpassed only by Florida in its output. Marble of rare purity and beauty, sandstone, limestone and slate are quarried. There are small quantities of silver, gold, barytes, manganese, potter's clay and petroleum.

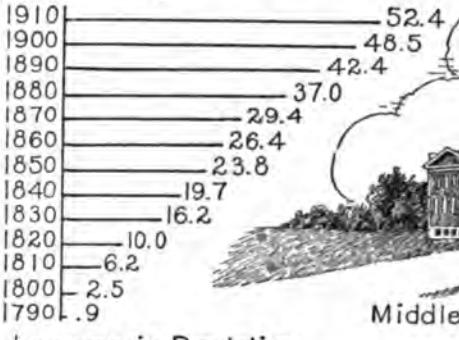
Manufactures. The raw materials for Tennessee's manufacturing industries are largely supplied by the natural resources of the state. Flour milling and lumbering are the chief industries, followed by iron and steel working, the manufacture of textiles and of cottonseed oil. Tennessee ranks twenty-sixth among the states in the value of manufactured products. Safety laws regulating conditions in factories have been passed, and since 1915 the labor of women has been restricted to fifty-seven hours a week.

Transportation. Tennessee has extensive facilities for water transportation in the Mississippi, Tennessee and Cumberland rivers. The Mississippi affords communication with the en-

TENNESSEE

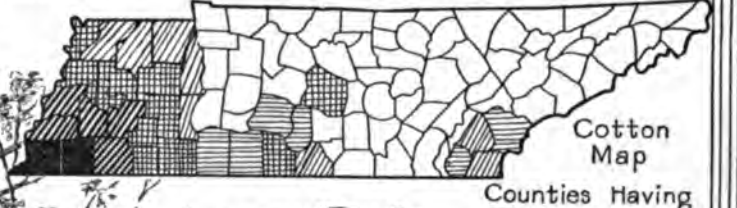


Congressional Districts



Increase in Population Per Sq. Mi. by Decades

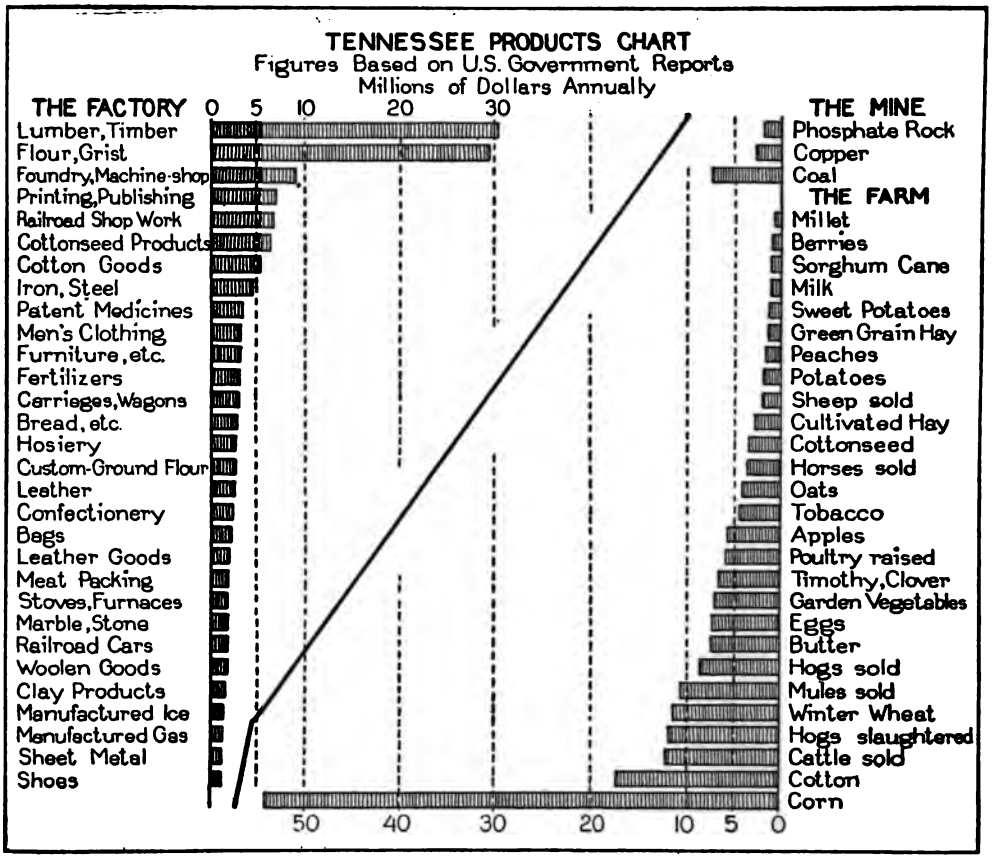
Middle Tennessee Normal School, Murfreesboro



Cotton Map

Counties Having
- Over 50,000 Acres
- 25,000 to 50,000 Acres
- 10,000 to 25,000 Acres
- 1,000 to 10,000 Acres
- 250 to 1,000 Acres

"The Hermitage", Andrew Jackson's Home, near Nashville



tire Mississippi Valley and the Gulf ports. The Tennessee is navigable for small vessels from Knoxville to the Ohio River, and the Cumberland is open to traffic about 500 miles. The latter river is the chief highway for the transportation of coal, and improvements are being made by the government which will make it navigable ten months of the year. Memphis, Chattanooga and Knoxville are ports of entry.

There are over 4,000 miles of steam roads and about 500 miles of electric railway in the state. The most important lines are the Nashville, Chattanooga & Saint Louis, the Louisville & Nashville, the Illinois Central, the Southern and the Tennessee Central.

In 1915 a state highway department was created, which is maintained by one-tenth of the annual motor-vehicle tax.

Government and History

Government. The third and present constitution of the state was adopted in 1870. Amendments may be proposed once in six years; before becoming part of the constitution, amendments must be approved by the majority of voters and by the assembly and by two-thirds of the succeeding legislature. Every attempt to amend the present constitution in important matters has been unsuccessful. The question of calling a convention for its revision is to be submitted to all male citizens who have paid a poll tax and have resided in the state one year.

The *legislative power* is vested in an assembly consisting of a house of representatives of ninety-nine members and a senate of thirty-three members. No clergyman is eligible to election to either house. The assembly meets biennially; the regular sessions are limited to seventy-five days and special sessions to twenty days.

The *executive department* consists of the governor, elected for two years; the secretary of state, comptroller and treasurer, elected by the legislature; the attorney-general, appointed

RESEARCH QUESTIONS ON TENNESSEE

(An Outline suitable for Tennessee will be found with the article "State.")

What organization which played a large part in history in the period after the War of Secession originated in this state?

Where is Tennessee's "drowned forest," and how was it submerged?

Is the highest point of land in the state loftier or less lofty than the highest point of each state upon which Tennessee borders?

What laws relating to industrial conditions has the state passed which shows its progressive character?

How were the eastern and western sections of the state divided in their sentiments on the slavery question in the years before the War of Secession?

What presidents are buried in the state? How many of these were born within the boundaries of the state?

How many states produce more coal than Tennessee? Name at least ten of these. (See article COAL, page 1446.)

When did Tennessee become a state? How many states besides the original thirteen were in the Union when it was admitted?

For what is the famous estate of a President of the United States in this state now used?

What is the Peabody Education Fund, and what school in Tennessee derives benefit from it?

How large a proportion of the area is still wooded? How does the state compare in this respect with Arkansas?

By what name was the territory comprising Tennessee known when it first came into the possession of the United States?

From what four sources is the revenue for the upkeep of the schools derived?

What class of the inhabitants, formerly neglected educationally, are now receiving the benefits of education?

How does Tennessee resemble Illinois in the character of its chief crop? How do the two states compare in the value of their chief crop?

Who called Tennessee the first free and independent commonwealth in this country established by men of American birth, and with what right is it so called?

If a man in the former days in Tennessee wanted an article valued at six shillings but had no money, how might he pay for it?

Why are the winters colder and the summers hotter in Tennessee than in Southern Italy, which is in the same latitude?

To what state did this territory originally belong? From what regions did the first settlers come?

How many states border upon Tennessee? How many other states have an equal number of boundary states?

How many states are larger? How many of these larger states have a greater population than Tennessee? (See list in article UNITED STATES.)

What stand has the state taken on the liquor question?

What two popular names does the state bear? Discover from the map the appropriateness of one of them? To what does the other refer?

What makes the Cumberland River so important commercially?

What is the railway mileage of the state to each hundred square miles of area? How does it compare in this respect with each of the states upon which it borders?

by the supreme court; the superintendent of public instruction, commissioners of agriculture, statistics and mines, assayer, entomologist and officials of the penitentiary, appointed by the governor. The governor may not serve more than three consecutive terms.

The *judicial department* consists of a supreme court and court of civil appeals, each having five judges elected for eight years, twelve chancery courts, nineteen circuit courts and county courts, each having one judge elected for eight years. There are also justices of the peace, and, in certain cities, there are recorder's courts.

Both the sale and manufacture of liquor is prohibited. Mothers' pension laws and child-labor acts have been passed.

Settlement and Early Government. Tennessee was probably first visited by De Soto, Marquette and La Salle in their explorations of the Mississippi Valley. The territory comprising the present state was included with North Carolina in an English grant to Sir Walter Raleigh. In 1750 colonists from Virginia reached and named the Cumberland River and Mountains. In 1754 and 1757 settlements were made by pioneers from North Carolina, but these were soon destroyed by the Indians.

The first permanent settlements were made in 1769, 1771 and 1772 by the Watauga Association, a company of colonists from Virginia and North Carolina who settled along the Watauga River. They organized a free and independent commonwealth, said by Theodore Roosevelt to be the first one of this country established by men of American birth. After the political insurrection in North Carolina in 1771, many of the "regulator" party opposed to the royal government made their way into the rugged wilderness of Tennessee, and in 1776 the territory was annexed to North Carolina as the District of Washington, the first spot in America named in honor of George Washington. The hardy mountaineers served in both the British and the Continental armies.

In 1784 North Carolina ceded the territory of Tennessee to the United States, but the inhabitants revolted and formed the state of Frankland, or Franklin, with Sevier as governor. Congress ignored the new state, and the jurisdiction of North Carolina was again established in 1788. Two years later Tennessee was ceded to Congress as the "Territory South of the Ohio." A steady stream of immigrants poured into it, and after a long struggle Indian and Spanish hostilities were suppressed, the final struggle occurring in 1794.

Statehood. On June 1, 1796, Tennessee was admitted as the sixteenth state of the Union. It was the first state created out of government territory; Kentucky and Vermont, which were previously admitted, were formed from territory belonging to individual states. The Tennessee troops under Andrew Jackson played a distinguished part in the War of 1812, and in the Creek and Seminole wars. In the war with Mexico in 1847, Tennessee won the name of "The Volunteer State," when 30,000 men enlisted at the call for 2,800 state troops.

The western, middle and eastern sections of the state remained divided in sentiment and almost distinct commonwealths until after the War of Secession. The eastern section was strongly Union in sentiment, and published the first abolition paper in the United States. In the question of secession the Confederate element finally prevailed, and Tennessee seceded June 8, 1861; it was the last of the states to withdraw from the Union. Next to Virginia, Tennessee was the chief battle ground of the war. There were 454 battles fought in the state, notable among them being the capture of forts Henry and Donelson, and the battles of Shiloh, Murfreesboro, Chattanooga, Lookout Mountain, Missionary Ridge, Franklin and Nashville. Tennessee, readmitted to the Union, July 24, 1866, was the first of the Confederate states to return to the Federal government. The state escaped the corrupt "carpetbag" government of Northern politicians, but the Ku-Klux Klan originated within its borders.

Tennessee boasts many distinguished men, including three Presidents of the United States—Jackson, Polk and Johnson—many Cabinet officers and Justices of the Supreme Court, and such military heroes as Farragut, Houston and Forrest.

Other Items of Interest. Reelfoot Lake, eighteen miles long and very shallow, largely covers a drowned forest which was submerged during an earthquake. Through the clear water the dead branches of the trees may be plainly seen.

In one of Tennessee's caves was found, long ago, the skeleton of a mastodon, and the cave is consequently known as Big Bone Cave.

From the top of Lookout Mountain, just on the boundary line of Tennessee, it is said that seven states may be seen.

In the early days coin was so scarce that no fewer than twenty articles were declared legal tender and given a definite value. Thus bacon was valued at sixpence a pound, a fox skin at

one shilling, sixpence, and a beaver skin at six shillings.

Warren County, Tennessee, is circular in shape and Overton is nearly so.

Violent storms of any sort are rare in this state, and the average velocity of the winds is low.

The Ku-Klux Klan began as a mere youthful prank, at Pulaski, Tennessee, but in a short time spread over the entire South.

Three Presidents of the United States, Jackson, Polk and Johnson, are buried in Tennessee, Jackson at "The Hermitage," Polk at Nashville, and Johnson at Greeneville. E.B.P.

Consult McGee's *History of Tennessee;* Haywood's *Civil and Political History of Tennessee.*

Related Subjects. The reader who is interested in Tennessee will find much that is helpful in the following articles in these volumes:

CITIES

Bristol	Knoxville
Chattanooga	Memphis
Jackson	Nashville
Johnson City	

HISTORY

Chattanooga, Battle of	Lookout Mountain, subhead *Battle of Lookout Mountain*
Fort Henry and Fort Donelson	Murfreesboro, Battle of
Frankland	Shiloh, Battle of
Ku-Klux Klan	

LEADING PRODUCTS

Coke	Phosphates
Cotton	Tobacco
Iron	

PHYSICAL FEATURES

Cumberland Mountains	Mississippi River
Cumberland River	Tennessee River

TENNESSEE, UNIVERSITY OF, a coeducational institution, located at Knoxville, one of the largest state institutions in the South. It was first chartered in 1794 as Blount College and became the University of Tennessee in 1879. The university is organized into the colleges of liberal arts, commerce, engineering, agriculture, law, medicine (including the school of pharmacy), dentistry, the summer school and the graduate school. The colleges of medicine and dentistry are at Memphis. In 1902 a teachers' summer school was opened on the campus, and it now has an enrolment of nearly 3,000 students. As a part of the extension work of the university, short courses in agriculture are given during the winter in a number of places throughout the state. The faculty numbers about 200, and the student enrolment is over 4,500. There are 40,000 volumes in the library.

TENNESSEE RIVER, the largest tributary of the Ohio, formed by the meeting of the Holston and the North Fork rivers at Kingsport, Tenn. These rivers rise in the Virginia Alleghanies. The main stream flows southwestward through Tennessee, enters Alabama at its northeast corner, dips in a great curve and flows out again at its northwest corner, reentering Tennessee. It then flows northward through that state and northwest across Kentucky, joining the Ohio at Paducah. Including the Holston, it is 1,200 miles long. Since the completion of the Muscle Shoals Canal (1889) around the shoals between Florence and Decatur, Ala., the Tennessee has been made navigable for a distance of over 500 miles, and is used for transporting farm merchandise, lumber, iron ore and cotton.

TENNIEL, *ten'yel,* SIR JOHN (1820-1914), an English cartoonist and book illustrator, famed for his political cartoons made for *Punch,* and for his inimitable illustrations that add so much to the charm of Carroll's *Alice in Wonderland* and *Through the Looking-glass.* He was born in London, and was practically a self-trained artist. When he became cartoonist for *Punch,* in 1851, he had already won distinction as the painter of a fresco, *Saint Cecilia,* for the House of Lords. His position on the staff of *Punch* was retained for half a century. Tenniel's work was admired for its originality and dignity, no less than for excellence of technique. Besides the *Alice* books he illustrated *Aesop's Fables,* Moore's *Lalla Rookh, The Ingoldsby Legends* and various other works.

TENNIS, *ten'is,* a game for two players, which was the forerunner of lawn tennis. It is played on an oblong covered court with a ball about two and one-half inches in diameter, and a racket heavier and with a smaller face than that used in the better known form of the game. At one end of the court is a division for spectators, called a *dedans.* The scoring and the object of the game are much the same as in lawn tennis, which is now usually called simply tennis. See LAWN TENNIS.

TENNYSON, *ten'i sun,* ALFRED (1809-1892), one of the great English poets of the Victorian Age, was born August 6, 1809. His father, the rector of Somersby, was a man of learning and of refined taste, and in the home a vivid imagination and a love for beauty were developed in Alfred and his brothers and sisters by familiarity with fairy legends and other fanciful tales. When seven years old, Alfred was sent to the Louth Grammar School, where he remained five years, and from that time on his education was cared for by his father until

1828, when he entered Cambridge University. In these years spent in his quiet, pleasant home he had plenty of time for reading and reflection, for the close observation of nature and for practice in poetic composition, and the first results of the period were seen in the little volume published in 1827, by Charles and Alfred Tennyson, entitled *Poems by Two Brothers.* The book attracted no attention, and brought to its authors only about $100.

Poetry of Student Days. The constantly secluded life at home had made the brothers rather shy, and when they entered the university they did not find it easy to make

ALFRED TENNYSON
One of the noblest and most representative figures in nineteenth-century literature.

friends. Gradually, however, some of the brightest young men of the school became acquainted with the brothers and made them members of the select society known as "The Apostles." In 1829 Alfred distinguished himself by winning the Chancellor's prize for his blank verse poem, *Timbuctoo,* and in the following year he published his *Poems, Chiefly Lyrical.* Critics found faults in this volume, but recognized, too, the promise of the young author; indeed, the melody of such poems as *Mariana* and *Oriana* could not fail to make itself felt.

Shortly before his father's death in 1831 Tennyson left Cambridge without receiving a degree. Two years later he published another volume of *Poems,* among which appeared some of the most exquisite of his lyrics, among them *The Lady of Shalott, The Palace of Art, The Lotus-Eaters, The Dream of Fair Women* and *Oenone.* Again the critics did not spare his work, and a particularly savage article appeared in the *Quarterly Review;* but had Tennyson written nothing after that time he would by that volume have proved his right to rank with the great English poets.

His Greatest Years. In 1833 an event occurred which affected the poet so profoundly that he remained in seclusion for ten years. This was the sudden death of his best friend, Arthur Henry Hallam, son of the historian. At the end of the long period of silence appeared a third collection of *Poems* containing, with others of special note, *Locksley Hall, Morte d'Arthur, Dora, Ulysses* and *Break, Break, Break,* and in 1847 was produced *The Princess,* a long narrative poem which is perhaps most noteworthy for the exquisitely finished songs interspersed through it. Among these are *Sweet and Low; The Splendor Falls on Castle Walls; Tears, Idle Tears,* and *As Through the Land.* These poems are marked by a depth of thought not found in any that preceded them; but the spiritual development which came as a direct result of Hallam's death found its fullest expression in the long elegy *In Memoriam,* composed of lyrics written at various times, but published as one poem in 1850. This masterpiece is equaled in its class only by Milton's *Lycidas* and Shelley's *Adonais.* Much longer than either, it presents all phases of the poet's grief, and takes up the most serious questions as to life, death and immortality.

Appointment as Poet Laureate. In the same year Tennyson was made poet laureate. He was then enabled to purchase the estate of Farringford, on the Isle of Wight, and to marry Miss Emily Sellwood, the lady to whom he had been long betrothed. Years later the poet said of her, "The peace of God came into my life before the altar when I wedded her." In 1868 Tennyson built Aldworth, his house near Haselmere, and thereafter passed his time between the new home and Farringford. Eight years before his death he was made Baron of Aldworth and Farringford.

After his appointment to the laureateship he produced *Maud,* a dramatic representation of a morbid man; *The Idylls of the King,* an idealistic treatment of the King Arthur legends, and perhaps his most popular work; *Enoch Arden,* portraying one of the noblest heroes in literature; the dramas *Queen Mary* and *Becket; Locksley Hall Sixty Years After; Demeter,* and several other volumes of poems and dramas. The Arthurian legends always had a fascination

for him, and before his use of them in the *Idylls* he had touched on them in such poems as *The Lady of Shalott* and *Sir Galahad.*

Estimate of His Work. Melody is perhaps the most notable characteristic of Tennyson's verse. At the outset it was sometimes secured at the expense of thought—the little lyric *Where Claribel Low Lieth,* for instance, is almost pure music without an idea. Later, however, the union of thought and melody was what he everywhere sought, and his ability to make sound fit sense is shown clearly in such contrasting lines as these from the *Passing of Arthur.* The first group are rugged and harsh, as fits the scene they describe; the second smooth, flowing, beautiful:

The bare, black cliff clang'd round him, as he based
His feet on juts of slippery crag, that rang,
Sharp-smitten with the dint of armed heels.

And on a sudden, lo! the level lake,
And the long glories of the winter moon.

The music of his verse was but an expression of the love for harmony which was one of his strongest characteristics; and he was keenly sensitive to the suffering which he saw in the world—the discords in life's harmony. It was to science that he looked for the righting of the world's wrongs, and thus he has been called the poet of science. Evolution has a large place in his writings. A.MC C.

Consult Ainger's *Tennyson for the Young;* Lyall's *Tennyson,* in English Men of Letters Series; Cary's *Tennyson: His Home, His Friends, and His Work.*

TENSE, a word derived from the Latin *tempo,* meaning *time,* and used in grammar to denote a form taken by a verb to express action or state in relation to time. Tense is indicated by changes in the form of verbs and by the use of auxiliary words, as shown in the conjugations given below.

Tense Forms of the Indicative. There are three principal tense divisions in the indicative mode—present, past and future—but in each case the act may be viewed as completed at some definite time in the present, past or future. Hence there are also three *perfect* tenses, denoting *perfected* action or state. The following tables gives these six tenses:

Present	I am, do, see, walk
Past	I was, did, saw, walked
Future	I shall be, do, see, walk
Present Perfect	I have been, done, seen, walked
Past Perfect	I had been, done, seen, walked
Future Perfect	I shall have been, done, seen, walked

Action in the present, past and future may also be represented as continuing, or in progress, and is then expressed thus:

I am doing, seeing, walking
I was doing, seeing, walking
I shall be doing, seeing, walking

The perfect tenses likewise have a form which shows that the action is continuous—

I have been doing, seeing, walking
I had been doing, seeing, walking
I shall have been doing, seeing, walking

Transitive verbs, like *to see,* may be conjugated in all tenses in both the active and the passive voices. The passive forms are *I am seen, I was seen, I shall be seen, I am being seen,* etc.

Past and Present Perfect. These two tense forms are sometimes confused. The distinction between them is this: Whereas the past tense expresses action merely as belonging to past time, the present perfect expresses action as belonging to past time but also as touching the present. It is correct to say, *The Japanese have made rapid progress within the last decade;* also, *The Japanese made rapid progress during the last half of the nineteenth century.* In the first case the action is viewed as coming up to the present, and in the second case simply as taking place in past time. It is incorrect, on the other hand, to make such statements as, *I have left school five years ago,* or *I wrote a letter the past half hour.* The correct forms are, *I left school five years ago;* and, *I have written a letter the past half hour.*

Past and Past Perfect. Compare the following: *Washington was first inaugurated in 1789; Washington had already been inaugurated when the first national census was taken.* In the first sentence there is a simple statement of action in past time, and in the second a statement of an act completed *before some other specified act.*

The Future Tenses. The simple future tense denotes an action that will take place at one time in the future, while the future perfect views an action as one that will be completed before the occurrence of some other future act. The distinction may be seen in the following: *I shall leave to-morrow at ten o'clock; I shall have left to-morrow before they arrive.*

Shall and Will. Most grammarians make the following distinction between *shall* and *will,* two auxiliary verbs used in forming the future tenses of the indicative: When used with the first person, both singular and plural, *shall* denotes simple futurity; when used with the sec-

ond and third persons it denotes command or necessity. *Will* in the first person, singular and plural, denotes purpose or intention, and in the second and third persons, simple future action. These meanings are compared in the following:

SIMPLE FUTURITY	COMMAND, NECESSITY OR INTENTION
I shall see you again	I will not apologize
You will know by to-morrow	You shall obey
He will arrive to-day	He shall make amends

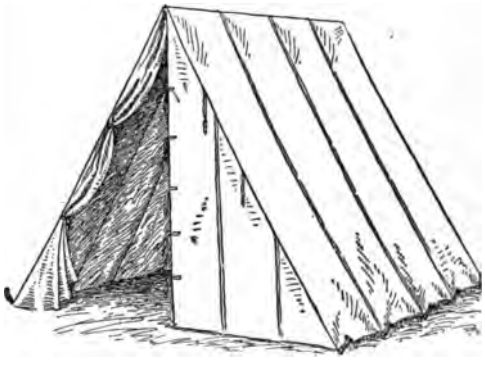
Other Modes. For tenses of the subjunctive and imperative modes, see MODE, page 3870.

The Infinitive. The infinitive has but two tenses—the present and perfect. The forms for both voices are as follows:

Present	to love, to be loved
Perfect	to have loved, to have been loved

TENT, a portable dwelling place, usually made of canvas. It is thought that tents are of Eastern origin, being introduced into Spain by Mohammedan invaders, from there spreading over Europe and later to America. The native Indians of North America made wigwams, tepees, or tents of bark and the skins of animals, probably long before white men set foot on the American continent. In many parts of Canada and the Northern United States the Indians still make their somewhat primitive dwellings, but for the most part have either learned to build houses or have adopted the modern canvas tent of the white man.

Various Forms. The simplest form of canvas tent follows the pattern of the Indian tepee;



AN "A" TENT

it is circular at the bottom and rises to a point in the center. The modern name for this tent is the *bell,* as it is bell-like in shape. This tent is used by nearly all armies and campers throughout the world. It is set up with a pole in the center, over which the tent is spread, pegs being driven into the ground at proper distances to which to attach ropes to keep the tent in position. The *"A"* tent (in the illustration) is equally simple in construction, and may be stretched over a ridgepole running from two upright poles and pegged down to the ground. The *wall tent* is the *"A"* tent with perpendicular walls to the height of two or three feet with the *A,* or gable, above, and is similarly erected and held in position. The wall tent has the advantage of giving more headroom than either the *"A"* or the "bell" tent.

A *marquee* is a large form of tent, chiefly devoted to show and social usages and to field hospitals with an army. The tents used by armies in peace times are quite different from those carried in war. In fact, the carrying of tents has in most armies been abandoned, except for what are called light "shelter tents," carried by each man. Modern war conditions do not allow of excess of weight in transport, and were full tent accommodations to be carried, it would necessitate the employment of at least double the usual number of wagons and animals for transport. Tents in active service have therefore given place to various temporary shelters. In the War of the Nations dugouts many feet below the surface of the earth sheltered fighters of all armies.

Among the Nomads. In the pastoral districts of Asia the main population has always lived in tents, and the rank and riches of the members of the various tribes are indicated by marks and symbols on their tents. The Bible speaks of the tents of Kedar, really Arabian tents of black goats' hair, which gave rise to the Eastern expression "black as the tents of Kedar." Even in modern times the nomadic Arab tribes carry with them their tents, and their homes are just where fancy or advantage may lead them to "pitch their tents." The tents of the East, however, are more elaborate than the military and camping-out tents of the West, being often divided into apartments, the partitions being of rugs and skins that, according to Western values, are almost priceless.

Suggestions to Campers. For campers in the United States and Canada, the procuring of a suitable tent is a simple matter. The choice is wide, and tent materials have been greatly improved within recent years. For ordinary purposes, the "bell" or *"A"* tent will be found most suitable. It is in the choice of locality and in the actual erection of the tent that experience is necessary. One of the simplest precautions is often neglected by parties camping out. That precaution is to avoid touching the sides

or top of the tent during storms. The drip of water through the canvas will not occur if the material is not touched from the inside, and if the roof is kept free from leaves. These facts should be borne in mind.

The digging of a trench round the tent is often regarded as unnecessary, yet neglect of this precaution has often turned a well-fitted tent into a morass. The trench to draw the water off, built with due regard to the slope of the ground on which the tent is pitched, should be regarded as one of the first essentials of comfortable camping out. Disasters would be less frequent if campers would apply good judgment and perhaps a few minutes' work daily to securing comfortable and hygienic surroundings. F.ST.A.

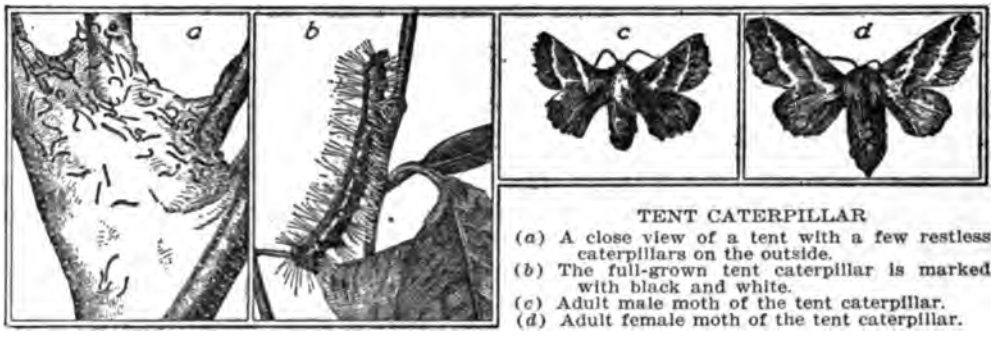
In this connection there will be found valuable material in the article CAMP, pages 1082-1086.

TENT CATERPILLAR, *kat'er pil er,* the larvae (young) of four species of silk-spinning moths, which feed upon the tender leaves of trees. They are so named because the moths spin tent-shaped webs. The most destructive kill them. In June the caterpillars scatter in all directions to spin their cocoons in some protected cranny in fences and buildings. Within these silvery sacs they change to pupae, and in two or three weeks emerge as moths to repeat the life history of the species.

The forest tent caterpillar, or forest army worm, like the apple-tree tent caterpillar, is common in Eastern United States. The moths are lighter in color than the ones described above, and have dark lines on their forewings and a row of light dots down the middle of the back. Their tents are less conspicuous and their eggs belts are more nearly circular.

The two western varieties are the California tent caterpillar, which is found upon oak trees in the early spring, and another species which infests fruit trees in late summer. W.F.B.

TEN'URE OF OFFICE ACT, the name given to two acts of the United States Congress which limited the President's power of removal of officers whom he had appointed. The first of these was passed in 1820, chiefly through the influence of William H. Crawford, then secre-



TENT CATERPILLAR

(*a*) A close view of a tent with a few restless caterpillars on the outside.
(*b*) The full-grown tent caterpillar is marked with black and white.
(*c*) Adult male moth of the tent caterpillar.
(*d*) Adult female moth of the tent caterpillar.

and conspicuous species is the apple tree tent caterpillar. The moths are dull, reddish-brown, the forewings being marked with two oblique, pale stripes. In July they lay their eggs, about 300 in number, in distinct belts on the branches of the apple and wild cherry trees. By fall the minute black caterpillars are fully developed, but they hibernate in the egg. In the early spring they eat their way out of their protective covering of shell and spin their tentlike canopies in the crotch of a branch.

So ravenous are their appetites that the occupants of a single tent eat 12,000 young leaves. The caterpillars file out of their tent to feed in the middle of the morning and again in the afternoon; hence, effectively to exterminate them, the tent should be destroyed in the early morning or evening when the occupants are at home. Spraying the tent with kerosene will

tary of the treasury. Because it limited the term of a large number of appointive officers to four years, this act is usually said to have laid the foundation for the introduction of the "spoils system," under which a change in the national administration was accompanied by sweeping removals of officeholders and by the appointment of friends and political adherents of the new President to succeed them (see CIVIL SERVICE IN THE UNITED STATES, subhead *Civil Service Reform*).

More generally known than this act of 1820 is the act of 1867, which Congress passed over the veto of President Andrew Johnson. Since the foundation of the national government it had been the custom to allow the President to dismiss at his pleasure any officers appointed by him. As the President was responsible for the acts of his subordinates, and as the Constitu-

tion did not require consent from the Senate, that body had not interfered in behalf of dismissed officials, even when its consent had been necessary to the appointment. Shortly after Johnson's inauguration, however, Congress began to indicate its disapproval of the President's policy, and there was soon open discord between them on the questions of reconstruction. Lest Johnson should exercise his powers of removal and thus perhaps interfere with the Congressional plan of reconstruction, Congress passed the Tenure of Office Act, which required the Senate's consent to the dismissal of any official, including members of the Cabinet, whose appointment required its consent.

The law was a startling innovation in the American government, and Johnson not unreasonably felt that it was a mistake and perhaps unconstitutional. His disregard of it when he removed Edwin M. Stanton from the office of Secretary of War was one of the causes of his impeachment. The law, however, was quickly understood to be an unjustified emergency measure, and during Grant's administration it was modified. Finally, in 1887, the act as a whole was repealed after a struggle between President Cleveland and Congress. W.F.Z.

TERENCE, *ter'ens* (Publius Terentius Afer) (about 185-about 159 B.C.), a Latin playwright, born at Carthage. The date and the place of his birth have been the subject of much dispute, but he is said to have been carried to Rome as a slave and educated there by a Roman senator. His first play was *Andria,* an immediate success which gained for him admission into the best Roman society. He went to Greece to study the comedies of Menander and Apollodorus, which he freely translated and adapted. From this voyage he never returned; accounts vary greatly as to the manner of his death.

During his brief life he succeeded in winning a permanent reputation, and that, too, though he was in no way an original writer. His ideal was artistic perfection, and the chief merit of his work is the perfect picture he has given of Greek life in the third century B.C., for his writings reflect nothing of the spirit of his own age and country. Plautus excels him in comic power, but not in tenderness and wit and character drawing. His six extant comedies, possibly representing all he ever wrote, are *Andria, Hecyra, Heauton-timoroumenos, Eunuchus, Phormio* and *Adelphi.* Advanced Latin students in college courses read at least one of Terence's works.

TERHUNE, *ter hune',* MARY VIRGINIA (1831-), an American novelist and writer on domestic science, better known as MARION HARLAND. She was born in Amelia County, Va., received a careful education at private schools and from tutors, and began very early to write for publication. Her first novel, *Alone,* appeared when she was but eighteen. This proved very successful, and her popularity grew with the appearance of her later novels, *The Hidden Path, Nemesis, Judith* and *A Gallant Fight.* She also wrote *Common Sense in the Household* and many articles for magazines and newspapers, largely on cookery and domestic economy. Her fiction has no great literary merit, but is interesting and of high moral tone. It is for her syndicated domestic science series of articles, extending over a period of many years, that she will long be remembered.

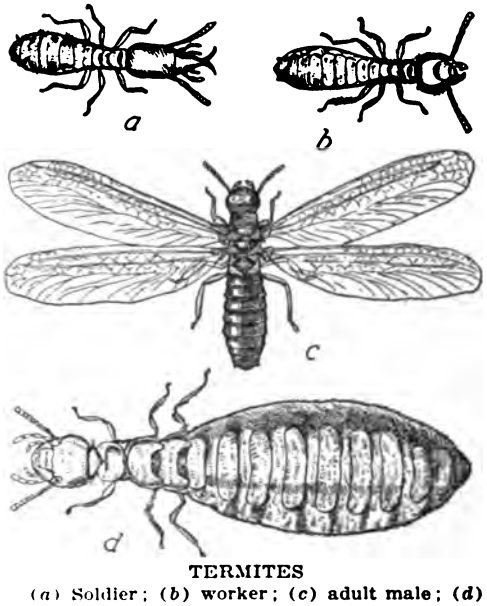
TERMITES, *tur'mites,* a family of insects commonly known as white ants, for they live in communities and have somewhat the appearance of ants. These two insect groups,

TERMITES' NEST IN THE TROPICS

however, belong to entirely different orders, for they are not related structurally (see INSECT, page 3000, for classification). Termites are found most abundantly in warm regions. They build huge mounds of mud, which are sometimes fifteen feet in height. The dome-shaped interior is divided into numerous chambers and galleries, and in the center is a closed-in cell where the king and queen are kept as prisoners. This royal pair constitute the perfect male and female of each colony. When they first

hatch from the eggs they have long, membranous wings, but after one flight into the air, during which the mating takes place, the wings break off at the base, and thereafter the pair are held as captives. In the cell the female undergoes an extraordinary transformation, for her body swells until it is large enough to hold many thousand eggs. As one zoölogist has expressed it, she becomes a "loathsome cylindrical package, two or three inches long, in shape like a sausage and as white as a bolster."

The eggs, deposited at the rate of several thousand a day, are borne away by the blind, wingless workers, which carry them to specially constructed cells and care for the larvae (young) as they are hatched. The workers make clay tunnels along the trunks and branches of trees, bringing back through them gums and decaying wood to feed the entire colony, and to them also falls the task of building and enlarging the nest. Another wingless class, the soldiers, have large heads and jaws and strong claws. They are supposed to defend the mound from attack. Soldiers, workers and king and queen develop from the same eggs, but scientists believe that the differences in structure result from the kind of food given the larvae. Termites are very destructive, for they tunnel their way through



TERMITES

(*a*) Soldier; (*b*) worker; (*c*) adult male; (*d*) queen.

the woodwork of houses, destroy books and furniture, and do great damage to sugar cane and orange trees. In Central America wooden telegraph poles cannot be used because of the tunneling habits of these insects.

TERNS, *turnz,* a group of birds which are related to the gulls and are distinguished for their powers of flight. The fifty or more species are found in all parts of the world, ten being native to North America. They may be

TERN AND NEST

seen on seacoasts and along rivers and lakes. Terns have long, pointed bills, webbed feet, and strong, large, pointed wings, which carry them through the air swiftly and for long distances. They seize their prey, which consists of small fish, by darting quickly into the water, bill pointing downward. Great colonies of these birds may be found on islands during the nesting season. The nests are usually placed in depressions in the ground, but sometimes the eggs are laid on the bare rock.

The largest species is the *Caspian* tern, a handsome bird nearly two feet long, with a crest of shining black, and pearl-gray back and wings. The smallest is the *least* tern, nine inches long. The beautiful *common* tern, once abundant on the Atlantic coast of North America, has been almost exterminated by egg and plume hunters, but is now protected by law and is again increasing in numbers. This bird has light, pearl-gray plumage, with white tail and throat. It is about fifteen inches in length. Its eggs are three or four in number, varying in color from whitish to brownish, thickly spotted with brown and lavender. Other species are the *gull-billed, royal, sooty* and *black* terns.

TERPSICHORE, *turp sik' o re,* one of the nine Muses, the patron of dancing, which she is said to have originated. She is represented as a laurel-crowned virgin holding a musical instrument in her hand. See MUSES.

TERRACE, *ter' ays,* in physical geography the name for a line of level, elevated land along the shore of a lake or river. Several frequently occur, one above the other, like giant steps.

River terraces are formed as a result of the cutting down of flood plains. That is, as a stream forms a deeper and narrower bed, the flood plain is gradually cut away, and finally a new and lower plain is built in the old valley floor, the remnants of which rise in terraces above the new level of the river. Each of several terraces marks a period of the down-cutting process, and the highest terrace is the oldest. Rivers in the terrace stage are much older than those in the flood-plain stage. Terraces along lakes, such as those on the shores of Lake Champlain, are the marks of former shore lines, and they indicate that the volume of water is less than it once was. There are prominent terraces around most of the Great Lakes. See FLOOD PLAIN; RIVER.

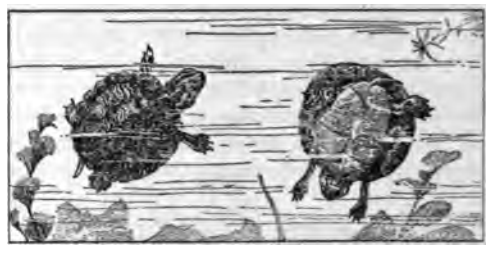
Terraces to a total of many thousand miles have been built on hillsides and mountain sides in China to provide additional land for cultivation, for in that country of 400,000,000 people every available foot of land is cultivated intensively. Like terraces are constructed by the mountain peoples of the Philippine Islands.

TER'RA COT'TA, a hard, durable and attractive form of earthenware, made from clay of superior quality, and used in making architectural decorations, pottery, garden vases, flowerpots, monuments, fountains, mantels, chimney pieces and similar objects. It may be produced in almost any color, but is usually a warm shade of red or a rich cream color. In the manufacture of terra cotta often clays from a number of different beds are secured. The material is weathered, ground, mixed with water, and with sand, pulverized fire brick or other vitrifying substance, tempered and then molded into the desired forms. The pieces, after being partially dried, are worked over by the finisher, and are then baked in large kilns. When a particular pattern is to be used several times, a model of the design is made, and a mold is taken into which the plastic material is forced by hand.

In some large cities the fronts of tall buildings are occasionally covered with white glazed terra cotta; such a surfacing has the advantage of being easily kept clean. Yet, notwithstanding the comparative cheapness of this substance as a building material, and its durability, lightness and resistance to heat, terra cotta is not so generally used in architecture as stone, marble, brick and granite, and its possibilities have yet to be thoroughly tested. Builders who use it must always take into consideration the fact that clay tends to shrink in drying and in firing, and in taking measurements allowance must be made for such shrinkage.

Among the ancients terra cotta was very extensively used. The Greeks and Romans employed it in making roof tiles, gutters, house ornaments, statues and statuettes, vases, tombs and coffins, imitations of metal jewelry, potters' and sculptors' molds and numerous other objects, and it also had an important place in mural decorations in relief. In Italy, in the Middle Ages, there flourished a school of terra cotta sculpture, founded by a member of the Della Robbia family (see ROBBIA, DELLA). There are valuable collections of Greek and Roman terra cottas in the Louvre, the British Museum, and in other museums of Europe.

TERRAPIN, *ter'a pin,* a general name loosely applied to several species of sluggish shelled reptiles, living in ponds, rivers and swamps, and more commonly called mud turtles. Although their home is in the water, where during the winter they bury themselves in the mud, they lay their eggs on land, often more than a mile from their haunts, depositing them in holes in the ground. In size these creatures vary from the *common mud turtle,* six or eight inches long, to the Southern *alligator terrapin,* which weighs from forty to one hundred pounds. Their bodies are covered with a slightly curved shell, and they have the power of drawing the feet, tail and head into this horny case. The shell, like the legs and head, is often marked with brilliant or delicate colors.



YELLOW-BELLIED TERRAPIN

The flesh of terrapin, especially of that known as the *diamond back,* is considered a table delicacy, and soup made from it is a dish "fit for the gods." The diamond-back species, which requires eighteen years to reach a suitable size, is now very rare. Commercially, male terrapin are known as *bull;* females, as *cows;* the young, little *bulls* and *heifers,* according to the sex. See TURTLE; TORTOISE.

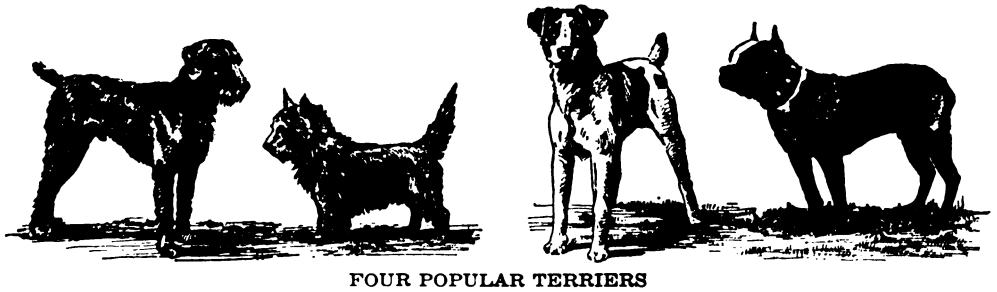
TERRE HAUTE, *ter'e hoht',* IND., the county seat of Vigo County, situated on the Wabash River about ten miles from the Illi-

nois state line. Indianapolis is seventy-two miles northeast, Chicago is 178 miles north and Saint Louis is 163 miles southwest. Railway transportation is provided by the Pennsylvania, the New York Central, the Chicago & Eastern Illinois and the Chicago, Terre Haute & Southeastern railroads; four interurban lines also enter the city. Terre Haute, settled in 1816 and incorporated in 1853, is one of the oldest settlements in the state. Its population was 58,157 in 1910; in 1916 it was 66,083 (Federal estimate). The area is nearly eight square miles.

The name of the city, which is the French for *high ground,* refers to its situation on a high plateau on the east side of the river. The region in which it is located has more than 400 square miles of coal lands, and immense hills of shale and clay; in some places there are alternating deposits of coal and shale. Coal is shipped from the city to points within a radius of 200 miles at the rate of about 1,500 carloads a day. Since the decline of natural gas in various parts of the state, manufacturing firms are here taking advantage of cheap fuel and fine shipping facilities, and the number of industrial plants is rapidly increasing. Four of the largest and best equipped clay-working plants in the Central West are in operation. About 1,000 people are employed in the enameling and stamping plant, and about 1,500 in the various glass works. Breweries, distilleries, malleable ironworks and foundries are other important manufactories of the city.

Terre Haute has fine schools and churches, and many noteworthy buildings. These include the county courthouse, city hall, post office, Deming Hotel, Elks' Club and Union Station. Among institutions of higher education are the Indiana State Normal School, with a fine library; Rose Polytechnic Institute, Saint Joseph's Academy and Saint Mary's-of-the-Woods College. The Emeline Fairbanks Memorial Library has 47,000 volumes. Saint Anthony's and Union hospitals and Saint Ann's and Rose orphan asylums are prominent benevolent institutions. More than fifty acres have been reserved for recreation grounds, of which Collett Park is the largest. A feature of historical interest is Fort Harrison, with its beautiful grounds, located on the Wabash River. It was built in 1810-1811 by order of Governor William Henry Harrison, later ninth President of the United States, and was under the command of Captain Zachary Taylor in 1812 (see HARRISON, WILLIAM HENRY, subhead *Governor of Indiana Territory*). G.C.N.

TERRIER, *ter'i er,* the general name of at least fifteen kinds of dogs originally bred and trained to drive foxes from their holes, or to dig out and kill still smaller animals, such as rats and mice. The name is taken from the Latin *terra,* meaning earth, and refers to their method of hunting. Such work demands strength, activity, grit and a very durable coat. The chief characteristics of terriers are gameness and grit; they appear to be absolutely fearless, yet are particularly affectionate and faithful.



FOUR POPULAR TERRIERS

Airedale Scotch Fox Boston

The fox and Scotch terriers are among the most popular varieties. The bull terrier, descended from the fox terrier and bulldog, is an agreeable companion, and while it possesses all the courage of the bulldog it has more intelligence and vigor. It makes an excellent watchdog, being faithful and slow to make friends.

The Airedale terrier has of recent years come into prominence and is one of the largest of the terriers, strong, active, courageous, and an excellent companion; and the Irish terrier always maintains his important rank among lovers of dogs. The Boston and the black and tan also have many admirers and make interesting and intelligent pets.

With the exception of the Scotch, the breeds mentioned above are long-legged, short-bodied, rough- or smooth-coated animals, therefore distinct from a second long-bodied, short-legged class including the Scotch, Skye, Yorkshire and

the Dandie Dinmont, together with the Shawtung (like the Skye) of Japan and the soft-haired terrier of Malta. Terriers, owing to their affectionate disposition, make delightful

"REX"
A fine specimen of bull terrier.

household pets, but their tempers depend on good treatment, and their health demands a daily walk or romp.

TERRITORIAL EXPANSION OF THE UNITED STATES. See article UNITED STATES, subtitle *Growth in Area and in Population.*

TERRITORY, *ter'i to ri,* in the United States, the name given to parts of the national domain which have not yet been formed into states. In this general sense the term has included, at various times, the following classes: (1) organized territories; (2) unorganized territories; (3) the District of Columbia; (4) insular possessions.

The government of all territories is under the direction of Congress, to whom the Constitution gives the right "to make all needful rules and regulations respecting the territory or other property belonging to the United States." The government of a territory is somewhat like that of a state, but it differs in that the authority of all territorial officials is derived from the national government. An organized territory, such as Alaska, has a governor appointed by the President, with the consent of the Senate, for four years, and a territorial legislature elected by the voters. The judges of the lower courts are also elected, but those of the higher courts are appointed by the President. In unorganized territories, there are no elected officials of any kind, all being appointed by the President, with the consent of the Senate. Thus the laws of the United States are extended to the unorganized territories, and are in fact their only laws; in an organized territory the acts of the legislature are subject to veto by Congress. There are now no unorganized territories, a measure of self-government having been granted even in the Philippines.

In the Philippine Islands, the Hawaiian Islands and Porto Rico, territorial government has been established. The District of Columbia, while usually defined as a territory, does not properly belong in that classification.

The territories have no regular Representatives in Congress; Alaska and the Hawaiian Islands, however, each send one Delegate (which see), who is assigned a seat in the House of Representatives; he may take part in debates which relate to his territory, and he may serve on committees, but he has no vote. The Philippine Islands and Porto Rico are represented in Congress by "resident commissioners," whose position is similar to that of the Delegates, except they are not assigned to committees. The territories usually send delegates to the national conventions of the great political parties.

Ordinarily, when a territory was first formed, it was *unorganized;* later, as its population grew, it was *organized.* After it had been a territory long enough to be fit, in the judgment of Congress, for statehood, it was admitted to the Union. Political considerations have usually been the important factors in determining whether or not a state should be admitted. No general rules were laid down for admission, but it was the rule that a territory should not become a state until it had enough people to entitle it to one member in the House of Representatives. Nevada, admitted in 1864, was a notable exception, for it had only 20,000 inhabitants at the time of its admission. Kansas was a territory for only four years before its admission, whereas Arizona and New Mexico waited sixty years.

For details of the government of the existing territories, see the subhead *Government* in the articles on ALASKA; HAWAII; PHILIPPINE

ISLANDS; PORTO RICO. For the government of GUAM, see that title.

In Canada and Australia. In the Dominion of Canada, Manitoba, Saskatchewan and Alberta were once under territorial government, and the North West Territories and Yukon Territory (which see) still have this form of administration. The government is similar to that of a territory in the United States. In Australia there is the Northern Territory, formerly a part of South Australia, but since 1911 under the jurisdiction of the Commonwealth. Papua, or British New Guinea, is also an Australian territory. W.F.Z.

TERROR, REIGN OF. See FRENCH REVOLUTION.

TERRY, ELLEN ALICIA (1848-), one of the greatest of English actresses, was born in Coventry. Her parents were players, and they began early to train their daughter for the same career. She was but eight years old when she first appeared on the stage as Mamillius, in Shakespeare's *Winter's Tale.* For the next ten years she played minor parts in various theaters throughout Great Britain, and then retired, in 1864, to marry the celebrated English painter, G. F. Watts. A divorce soon followed, however, and in 1867 she again turned to the stage, appearing as Katharina in Shakespeare's *Taming of the Shrew.* Sir Henry Irving was the leading actor in this production, and her support of his work was gaining her wide notice when she again retired, in 1868, to marry Charles Wardell. Seven years passed before she reëntered theatrical life, and then, having once more secured a divorce, she appeared as Portia in *The Merchant of Venice,* in London. In 1878, with Irving, she played Ophelia in *Hamlet* with so much pathos and sentiment that British critics gave her extravagant praise, and Irving retained her in his company as leading woman until 1902.

ELLEN TERRY
For a generation England's most notable actress.

She made her first tour of America with him in 1883 and met with such success, especially in highly emotional parts, that she repeated the trip nearly every year. As Portia, Lady Macbeth, Desdemona, Cordelia and other Shakespearean women characters, she had few equals in pathos, daintiness and grace during the nineteenth century. Nor has her ability been confined to the older dramas. In such modern plays as *Alice-Sit-by-the-Fire,* by J. M. Barrie, and *Captain Brassbound's Conversion,* by Bernard Shaw, she has shown a remarkable grasp of modern social conditions and manners in her acting. On April 28, 1906, she celebrated her stage jubilee, the fiftieth anniversary of her first appearance as an actress, and it seemed as though all London turned out to honor her. On that occasion a purse of $40,000 was presented to her in the name of British citizens. During the next year she surprised her thousands of admirers by marrying at Pittsburgh a young American actor, James Carew. M.R.T.

Consult her own *Story of My Life;* also Hiatt's *Ellen Terry and Her Impersonations.*

TERTIARY, *tur'shi a ri,* **PERIOD,** a name employed formerly by geologists to designate the first period of the Cenozoic Era. *Tertiary* was applied also to the rock formations of that period. It included what under modern classification forms the Eocene, Oligocene, Miocene and Pliocene periods. The term is now but little used.

Related Subjects. For a fuller understanding of this period, the reader is referred to the following articles in these volumes:

Cenozoic Era	Miocene Period
Eocene Period	Pliocene Period
Geology	

TERTULLIAN, *ter tul'i an,* the first and one of the greatest of the Western Church fathers, and the creator of Latin Christian literature. He was born and educated at Carthage, North Africa, in the latter part of the second century. After reaching manhood he went to Rome, where he was converted to Christianity. After a visit to Greece and on his return to Carthage, he became absorbed in the study of works on the Christian faith and in the effort to harmonize their teachings. Coming into conflict with the laxity of the Church in the West, Tertullian withdrew from its membership and became the leader of a group of montanists, an austere sect which put much emphasis on holy living. His writings, with those of Cyprian, who put them into current language, were widely read in the Latin Church in the fourth century. Many of them are still in existence. Of these the best known is the *Apology,* a vigorous defense of Christianity.

TESLA, *tes'lah,* NIKOLA (1857-), a famous electrician, the inventor of numerous

electrical devices, was born in Smiljan, in Austrian Croatia. His studies at the Gratz Polytechnic School aroused an interest in engineering and electricity, and when he went to Prague and Budapest he continued work in these, while pursuing courses in languages and philosophy. After being employed in the government telegraphic engineering department of Austria, he became an engineer in Paris, then set out for America, and for a time was under the direction of Thomas A. Edison.

For purposes of independent research Tesla established electrical laboratories in New York City, and resulting inventions have been distinguished alike for their brilliance and for their practicability. He was the first to substitute the alternating current for the direct current—a simpler and more economical method of converting electrical into mechanical energy. His principle of the rotary magnetic field is now in use in transmitting the power of Niagara Falls to near-by cities. His other inventions include improvements in dynamos, arc lights and incandescent lamps, condensers and induction coils.

TEST ACTS, the general name given to certain religious acts passed by the English Parliament, which were intended to prevent any but members of the Established Church from holding public office. Among the principal test acts were the Corporation Act of 1661, which decreed that all magistrates must take oaths of allegiance and supremacy, and must receive communion according to the Church of England; and the Test Act of 1673, which prescribed the same tests for the holders of public offices. These laws were repealed in 1828.

TETANUS, *tet'a nus,* the medical term for lockjaw (which see).

TETRAZZINI, *ta traht se' ne,* LUISA (1874-), one of the greatest coloratura sopranos of the modern operatic stage, possessing a voice remarkable for its great range, and for the purity of its high staccato notes. She received her musical education in her native city, Florence, making her professional début in 1895.

TETRAZZINI

Although she attained considerable success in Italy, Russia, South America and Mexico, it is San Francisco which claims the honor of having "discovered" Tetrazzini, and of having first acclaimed her a second Patti. In 1908 she repeated her triumphs at the Metropolitan Opera House in New York, singing there the part of Violetta in *La Traviata,* and thereafter was an established favorite in grand opera and concert work in various American cities. Her repertory consists of about forty rôles, including the leading soprano parts in *Rigoletto, La Sonnambula, Lucia di Lammermoor, Lakme* and *The Cobbler and the Fairy.*

TETZEL, *tet'sel,* JOHANN (1460-1519), a German monk of the Dominican Order, famous as the opponent of Martin Luther at the beginning of the Reformation. Tetzel was born in Saxony and was educated at the University of Leipzig. Soon after his graduation he joined the Dominican brotherhood, and speedily became known as an eloquent preacher. In 1516 he appeared in the vicinity of Wittenberg, where he preached to the people concerning the granting of indulgence to those who would contribute to the fund for building Saint Peter's, at Rome. Luther's famous ninety-five theses were directed against Tetzel's methods, and they caused intense excitement throughout Germany. Tetzel himself published a series of theses answering Luther, but his course had been such as to offend the authorities of the Church, and a few months before his death he was summoned to appear before the Papal legate and was rebuked for extravagant language and improper conduct. See REFORMATION, THE.

TEUTONIC KNIGHTS, *tu ton'ik nites,* one of the three great military and religious orders which was founded during the Crusades, the others being the Knights Templars and the Knights Hospitalers of Saint John. The year of its establishment was 1190; the organizers were German merchants of Bremen and Lübeck, who were moved by the sufferings of the Crusaders to found a hospital for them at Acre. Like the other orders, it consisted originally of knights or nobles only, but later admitted priests and lay brothers of lower rank. All wore the distinctive white robe with a black cross, and took the vows of poverty, chastity and obedience.

In 1225 the Teutonic Knights, having fought against the infidels in Palestine and acquired considerable land and many special privileges, undertook a crusade against the Prussians, who

were then pagans, and by 1283 had established their rule over Prussia. They held that country until 1466, then were compelled to cede West Prussia to Poland; and in 1525 the grand master of the order transformed East Prussia into a hereditary secular duchy. He also declared the order disbanded, for he himself had become a Protestant, but the loyal Catholic knights kept up the organization, the headquarters of which were at Mergentheim in Swabia. Napoleon I dissolved the order in 1809, and its possessions in various countries were confiscated by the sovereigns of the countries in which they were located. In 1840 the emperor of Austria reorganized the Teutonic Knights as an Austrian imperial order, admitting priests and sisters who in time of war are engaged in hospital and ambulance service.

TEUTONIC RACES, the term applied to a branch of the Aryan family. At the present time it is divided into two principal divisions; these are the Scandinavians, including the Danes, Swedes, Norwegians and Icelanders, and the Germanic, including the German-speaking people of Germany proper, Austria, Switzerland and the Netherlands, the Flemings of Belgium and the descendants of the Anglo-Saxons in Great Britain and America. See RACES OF MEN.

TEXARKANA, *tek sahr kan'a,* TEX., and TEXARKANA, ARK., are separate municipalities but are commercially and industrially one city. They are separated by the state boundary between Texas and Arkansas. Texarkana, Tex., is in Bowie County, and Texarkana, Ark., is the county seat of Miller County. The cities are 145 miles southwest of Little Rock, Ark., about thirty miles from the southeast corner of Oklahoma, and about the same distance from the northwest corner of Louisiana. They are served by the Kansas City Southern, the Memphis, Dallas & Gulf, the Saint Louis, Iron Mountain & Southern, the Saint Louis Southwestern and the Texas & Pacific railroads. The population of Texarkana in Arkansas was 5,655 in 1910. In 1910 Texarkana in Texas had 9,790 inhabitants; in 1916 the population of the latter was 12,640 (Federal estimate).

Prominent features are the Federal post office, which is built across the state boundary and lies in both cities, two city halls, the Miller County courthouse and jail, the railroad hospital, which cost $200,000, sanitariums, churches and Saint Agnes Academy. There is a good export trade in lumber and cotton, cottonseed oil and hides. Important industrial establishments include various plants connected with the cotton industry, railroad shops, furniture and pottery factories, lumber mills and machine shops. Both places were settled in 1873, and both were incorporated as cities in 1887.

TEXAS, one of the south-central states and the largest commonwealth in the American Union. It is no longer a lonely plain, but, rich in natural resources, it is to-day a progressive and a prosperous state. Unlike any other state, it was an independent republic when admitted into the Union (see subtitle *History,* below). It was named for the Texas Indians, who occupied part of the territory; *friends* is given as the most probable meaning of the name. Texas is popularly known as the LONE STAR STATE, because of the single star in the flag of the republic. The bluebonnet is the state flower.

Size and Location. Having an area of 265,896 square miles, Texas is larger than the states of Michigan, Wisconsin, Iowa, Illinois and Indiana combined. It is nearly six times the size of the state of New York and about 10,000 square miles larger than the province of Alberta. Point Isabel on the Gulf coast, and Texline, a town on the Texas-New Mexico border, are 1,107 miles apart, and this distance is 200 miles more than the shortest rail route between Chicago and New York. The city of El Paso in Western Texas lies at a greater distance from Texarkana than does the city of Chicago, and

one can travel almost as far within the state as in making the journey from Texarkana to the Atlantic coast.

With the exception of Florida, Texas is the southernmost state in the Union; it is midway between the Arctic Circle and the equator, and equidistant from the Atlantic and Pacific oceans. There are 3,495 square miles of water in the state; its irregular boundaries are largely formed by rivers, and on the southeast lies the Gulf of Mexico.

The People. As Texas is one of the younger states, its population is not yet large enough fully to develop its wonderful resources. Having 3,896,542 inhabitants—fewer than live in the city of New York—at the census of 1910, it ranked fifth in population among the states of the Union. The average density of the population was 14.8, as compared with 30.9, the average for the entire United States. However, the number of inhabitants is steadily growing, and the population was estimated at 4,472,494 on January 1, 1917, showing an increase of over sixteen per cent since 1910. There are more than 690,000 negroes in the state, and of foreigners the Mexicans are most numerous. In the south and west of Texas a large part of the labor on the farms and ranches is done by Mexicans.

All but twenty-four per cent of the population live in rural communities. The largest cities are San Antonio and Dallas, each having over 110,000 inhabitants; Fort Worth, Houston, El Paso, Galveston, Austin, Waco, Beaumont and Laredo.

The largest religious bodies are the Baptist and Methodist. The Roman Catholic, Disciples of Christ, Presbyterian and Episcopalian denominations are also important.

Education. Texas has an excellent system of public schools, under the supervision of the state superintendent of public instruction and a board of education consisting of the governor, comptroller, secretary of state and the state superintendent. County schools are administered by county boards and commissioners; city schools are regulated by municipal boards of education. In 1915 three assistant superintendents were appointed, an appropriation was made for the purpose of establishing departments of vocational training in the high schools, and education was made compulsory. In 1910 the illiteracy of the state was 9.9 per cent, which is small, considering the large number of Mexicans and negroes. Factories may not legally employ illiterate children under fourteen years of age.

Texas has a permanent school fund of $83,900,000, which is larger than that of any other state in the Union. Separate schools are maintained for the white and negro pupils, but the Mexicans attend the schools for the white children. Besides the elementary and high schools, the state maintains normal schools at Canyon City, Huntsville, Denton and San Marcos; a school of industrial arts at Denton; a normal and industrial college for the colored at Prairie View; the state university at Austin, with a medical department at Galveston, and an agricultural and mechanical college at College Station. Other prominent institutions of higher education are Southwestern University at Georgetown (Methodist); Texas Christian University at Fort Worth; Baylor University at Waco (Baptist); Trinity University at Waxahachie (Presbyterian); and the University of Dallas at Dallas.

Texas has been conspicuous among the Southern states in its provision for the scientific care of dependents and defectives. In 1915 this state was added to the short list of those in which provision is made for the care of crippled and deformed children, and the Walter Colquitt Memorial Children's Hospital was taken over by the state. Other state institutions of charity and correction are insane asylums at Austin, Terrell and San Antonio; an orphans' home at Corsicana; an epileptic colony at Abilene; a school for the deaf and dumb, homes for Confederate soldiers and Confederate women and an institution for the colored deaf, dumb and blind at Austin; a girls' training school at Gainesville; a juvenile training school at Gatesville, and penitentiaries at Huntsville and Rusk. Each of these institutions is controlled by its own superintendent and board of managers, who are appointed by the governor. The honor system and some form of profit-sharing labor have been established in recent years, in common with other states, in the penitentiaries.

Physical Characteristics and Resources

The Land. Texas consists of several vast plains sloping from the mountainous table-land in the northwest to the low, marshy shores of the Gulf of Mexico. The northeastern section is an undulating timberland where there are dense forests of pine and impenetrable thickets

of hawthorn, holly and magnolia trees, filled with the notes of the mocking bird, the most common song bird of the state. In the southeastern section, the lowlands and flat prairies, extending westward from the coast, rise gradually to low hills which in the west become high and rugged.

The great Black and Grand prairies of the east-central section are the finest agricultural regions in the state. Toward the west these prairies become broken and rise to meet the Great Plains, a vast, treeless table-land, rising in a series of steppes from an elevation of 700 feet to the mountains west of the Pecos River. The northern part of this section, known as the *Llano Estacado,* or Staked Plain, extends into New Mexico.

West of the Pecos River the elevated plains of gama and buffalo grass are crossed by four spurs of the Rocky Mountains. These lofty masses, locally known as "lost mountains," do not form continuous ranges. There are several peaks over 8,000 feet in altitude. Except for growths of yucca and mesquite, the lower slopes of the mountains are bare of trees, but their summits are clothed with dense forests.

The entire Texas coast is bordered by long sandbars or islands which enclose shallow coast lagoons. Padre Island, the largest of these bars, is 100 miles long and is the most noted island of its kind in the world. Others are Galveston, on which the city of the same name is situated, Matagorda, Saint Joseph and Mustang islands. There are several shallow bays, including those of Galveston, Matagorda, Corpus Christi and San Antonio, in the deepening and dredging of which the government annually spends many thousands of dollars.

Rivers and Lakes. All of the forty-four rivers of the state except the Red and the Canadian, which empty into the Mississippi, belong to the Texas system, and all but the Rio Grande and its tributary, the Pecos, which rise in the mountains of Colorado and New Mexico, have their sources in the Texas table-land or plains. The rivers have a general southeast course and empty into the Gulf of Mexico. In the west the streams are swift and clear, but near the coast they become sluggish and muddy, and their channels are often obstructed by sandbars.

The Rio Grande for most of its length of 1,800 miles forms the boundary between Texas and Mexico. In times of high water it is navigable as far as Rio Grande City. Its principal tributary is the Pecos, which flows south across the western parts of the state. The most important river is the Brazos, which flows for 900 miles through the richest and most developed section in the state and is navigable forty miles from the Gulf at all seasons of the year. The Red River, rising in the Great Plains, forms part of the northern boundary, and the eastern boundary is formed in part by the Sabine (called by the Mexicans *Sabinas,* meaning *cypress*), which flows south to the Gulf, through dismal, moss-hung cypress swamps. The Colorado, fed by the Concho, San Saba, Llano and smaller streams, cuts its way through beautiful deep canyons and empties into Matagorda Bay. Other rivers of importance are the Neches, Guadalupe, Trinity, San Mario, San Antonio and Nueces.

OUTLINE MAP OF TEXAS

Showing boundaries, navigable rivers, chief cities, locations of mineral wealth and the highest point of land in the state.

Texas has no large bodies of water, but there are many small, fresh-water lakes in the coastal plain, among which are Grand, Clear and Sabinas lakes. Caddo Lake lies on the Louisiana border, and salt ponds are found near the mouth of the Rio Grande, in the Llano Estacado and the Trans-Pecos region.

Climate. Within the vast bounds of Texas the climate ranges from the moderately temperate to the subtropical. Along the southeast coast the country is low and the climate warm; in the northeast it is low and damp but cool; in the central and western regions it is high, dry and cool. As one leaves the coast and passes through the prairies and plains to the western mountains, the climate grows uniformly cooler, the temperature ranging from 73° on the Lower

Rio Grande to 36° in the "Panhandle," the northwest corner between New Mexico and Oklahoma. The Gulf winds temper the heat of summer and modify the winter cold, and the mild, delightful winters of Southern Texas have made that section a popular winter resort. During the winter months occasionally there are disagreeable northwest winds called *northers*, accompanied by sleet and heavy rains. See NORTHER.

The rainfall is heaviest in the northeastern sections, where it averages from fifty to sixty inches a year. The precipitation decreases toward the south and west, and in the extreme western part of the state the annual average is only ten to twenty inches. Irrigation is necessary throughout the western and west-central sections. On the coast the autumn months are wettest, but in the north the spring is the rainy season.

Agriculture. The great fertile area of Texas makes it one of the most important agricultural states in the Union, even though its vast resources and possibilities are still far from their full development. It is surpassed only by Illinois and Iowa in the value of crops. There are in the state over 112,500,000 acres of cultivated land, an area equaled in no other state, and there is scarcely any known crop of the temperate zone that cannot be raised somewhere within the boundaries of Texas.

The chief crop is cotton, which is most extensively grown in the coastal plain and central and northern prairies. In 1916 the crop was 3,775,000 bales, valued at $350,796,000, and Texas has for some years ranked first among the states in the production of both cotton and cottonseed.

The cultivation of rice has become an important industry along the coast, where the fields are flooded by water pumped from the lagoons and streams. The rice fields embrace an area as large as the state of South Carolina, and they yield a crop second only to that of Louisiana. The fertile valleys of the lower Brazos, Trinity, Colorado and Guadalupe rivers are among the finest sugar regions in the United States, and Texas follows Louisiana and Georgia in the production of sugar cane. Among the cereals corn is the most important crop. Texas is also one of the leading corn states of the Union, and it produces more kafir corn than any other state. The corn crop was 131,100,000 bushels in 1916, according to United States government estimates. The state also produces large crops of wheat, oats, rye, barley, alfalfa, hay, tobacco and potatoes. Truck gardening is important, and large quantities of vegetables are shipped to Northern markets. The fruit of Texas, especially the Elberta peach, is noted for its excellent quality. In 1915 the peach crop was valued at $3,650,000. Apples, pears, plums and grapes are also grown, and in the production of figs and in nursery products Texas is one of the leading states in the Union.

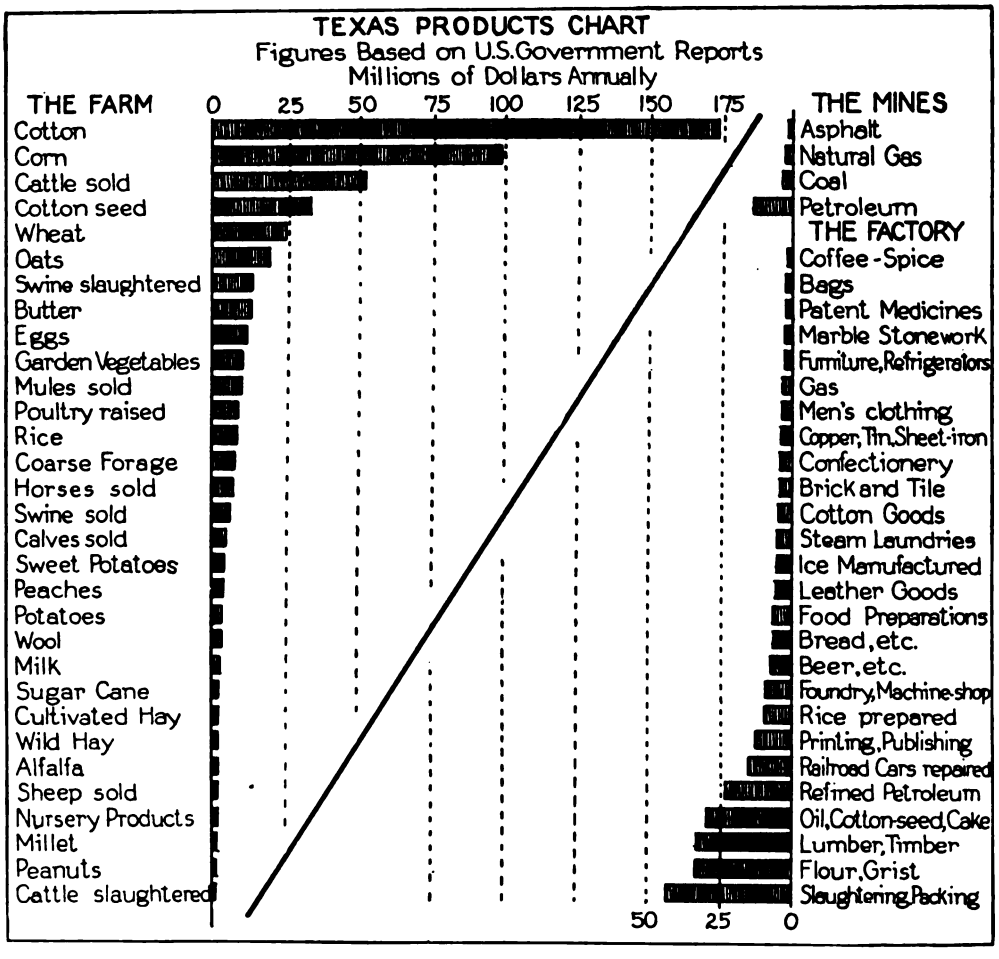
The Cattle Ranches. The nutritious grasses of the far-reaching plains furnish pasturage for immense herds and flocks, and in the number and extent of cattle ranches Texas surpasses all of the other states. The live stock in the state in January, 1916, was valued at more than $400,000,000. Much of the live stock is slaughtered in Texas, but large shipments are also sent to the packing centers at Kansas City, Saint Louis and Chicago.

Irrigation. Under an irrigation law of 1913, Texas was divided into three water divisions, and a board of engineers was created to have charge of the water resources of the state. The arid region along the Upper Rio Grande is included in the Texas-New Mexico Federal reclamation project, and there are over 28,400 acres watered by this system. The Lower Rio Grande and the numerous artesian wells of the south and east-central region furnish water for many private irrigation systems.

Forests. One of the chief sources of the great wealth of Texas is its timber. The yellow pine, which is the most important timber of the United States, is the principal lumber product. Hard woods are found along the western edge of the dense pine forests; dark cypress swamps border the Trinity, Neches and Sabine rivers, and groves of pecan, walnut and other nut bearers are also found along the eastern streams. The stunted blackjack of the east-central region and the gnarled mesquite of the western plains are used extensively for firewood. In the value of timber products, Texas ranks fifth among the states. In 1915 the state provided for the appointment of a state forester and board of forestry, and also for the purchase of forest reserves and coöperation with the Federal government in forest-fire protection.

Fisheries. Oysters, clams and shrimp abound in the shallow waters along the coast. The oyster culture in Matagorda Bay is under state supervision and is of special importance. The redfish caught in the deeper waters of the Gulf are also one of the important fisheries products.

Minerals. The mineral resources of the state are being developed rapidly, but the produc-



tion still falls far short of the possible output. There are extensive fields of bituminous and lignite coal in the north and east-central sections, and also a large field along the Rio Grande, between Laredo and Eagle Pass. They cover a total area of over 63,000 square miles and have an estimated available supply of 30,960,000,000 short tons. There are beds of a very pure iron ore in the east and central mineral belts, and also in the mountainous region west of the Pecos River.

One of the newest and the most important of the mineral industries is the production of petroleum. Oil was first discovered in the Corsicana field in 1894, and since that time the number of wells has steadily increased. The production in 1914 exceeded all previous records and showed an increase of thirty-four per cent over that of the preceding year. In 1915 Texas was outranked by only three states, California, Oklahoma and Illinois, in the output of petroleum. Both illuminating oil and that used for fuel are produced. The Spindle Top oil field, near Beaumont, is famous for its spouting wells, locally known as "gushers," which produce from 25,000 to 50,000 barrels a day. Closely associated with this industry is the production of natural gas, in which Texas ranks eighth among the states. The production of cement is the industry next in importance. The state stands high in this product, and also in the output of asphalt and quicksilver. Large deposits of salt and a very pure gypsum are found in the north; gold, silver, copper, lead and zinc are mined in the western mountains; an extensive field of cinnabar lies along the Rio Grande in the west, and clay and building stones, including sandstone, limestone, granite and marble, are found in many counties.

Texas has an abundant supply of artesian and mineral waters. The artesian belt, one of

the largest in the world, embraces an area of 120,000 square miles, and many of the chief cities in the eastern part of the state, including Galveston, Houston, Dallas and Waco, derive their water supply from it. Some of the mineral waters are hot and have valuable medicinal properties. Among the most noted springs and wells near which great health resorts have been established are Mineral Wells, Wooten Wells, Sour Lake Mineral Springs, Marlin Hot Wells, Palo Pinto Crystal Wells and Lampasas Springs. The annual value of the mineral products of the state exceeds $30,300,000.

Manufactures. Although Texas is chiefly an agricultural and stock-raising state, the abundance of raw materials and the plentiful supply of cheap fuel from the local coal and oil fields are rapidly developing large manufacturing industries. The most important of these are slaughtering and meat packing and the milling of lumber and flour. Texas manufactures more cottonseed oil and cake than any other state in the Union, and is surpassed only by Pennsylvania in the manufacture of ice and by Louisiana in the refining of sugar, making of molasses and cleaning and polishing of rice. Car repairs and foundry work, the manufacture of brick and tile and the canning of fruits and vegetables are other important industries.

Transportation and Commerce. Truly a vast railroad system would be required to furnish adequate transportation in all parts of this state of magnificent distances. Although Texas has a greater railroad mileage than any other state in the Union, many of the southern coast counties and sections of the extreme west and northwest are still without railroad accommodations. There are, however, over 15,700 miles of railroad in the state, and the construction of new branches and spurs is steadily progressing. Two trunk lines cross Texas from east to west en route to the Pacific coast, and two lines extending from the northeast to the southwest corners of the state reach into Mexico. Facilities for transportation in the northeast and central parts of the state are excellent. The most important roads include the Galveston, Harrisburg & San Antonio; the Missouri, Kansas & Texas; the International & Great Northern, and the Texas & Pacific. The chief railway centers are El Paso, the terminus of seven railroads, Houston, Galveston, Fort Worth, Dallas, Greenville and Waco. There are over 900 miles of interurban electric railway and ninety miles of interurban railroad run by gasoline power. Of the public roads, which cover 128,900 miles, 9,700 miles are surfaced.

Galveston is by far the chief cotton-shipping port of the United States, and, with the exception of New York and New Orleans, the most important commercial port of the country for exports and imports.

Government and History

Government. Texas is governed under the constitution of 1876, which is the fourth adopted since the admission of the state, the others being those of 1845, 1866 and 1868. All male citizens and aliens who have declared their intention of becoming citizens, who have lived in the state one year and in the county six months immediately preceding the election, except paupers, criminals, defectives, soldiers, sailors and persons who have taken part in a duel, are entitled to vote. An amendment may be proposed by two-thirds of the members of each house of the legislature, and it becomes effective if approved by a majority of the voters.

The *executive* power is vested in a governor, lieutenant-governor, secretary of state, comptroller, treasurer, attorney-general and commissioner of the general land office. There is an unusual provision that the secretary of state shall be appointed by the governor, but all other state officials are elected by the people for terms of two years. A surviving trace of the government of the Texan republic is seen in the extensive powers of the governor, who has, in addition to the usual privileges of the state executive, an extensive power of appointment and the power of veto over the separate items in appropriation bills. A two-thirds vote in each house is necessary to pass over his veto.

The *legislative* department consists of a senate of thirty-one members, elected for four years, and a house of representatives whose membership cannot exceed 150. Representatives are elected for two years. Bills for raising revenue must originate in the lower house, but may be rejected or amended by the senate. The legislature meets biennially, and the governor may call special sessions.

The *judicial* department consists of a supreme court, a court of criminal appeals and a court of civil appeals, each having three judges elected for six years; district courts, having one judge elected for four years; county courts;

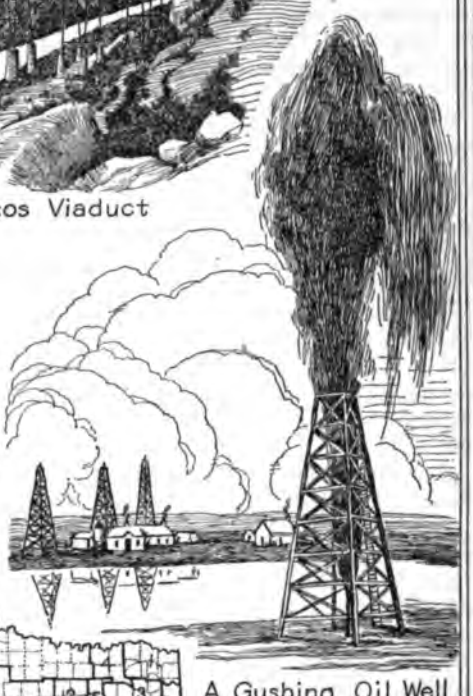
TEXAS

State Flower

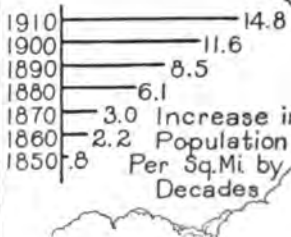
State Seal

The Great Pecos Viaduct

In the Alamo Plaza



A Gushing Oil Well



Congressional Districts

Religions

State University

commissioners' courts, and justices of the peace. In the judicial system there are many traces of the old Spanish government in Texas.

The county is the unit of local government. The commission form of government originated in Texas, and has been widely adopted in the state. Atheists are excluded from all offices. In 1907 local option was established, and there are numerous "dry" counties in the state. Workmen's compensation acts, labor laws and other progressive measures have been passed.

Exploration and Settlement. The history of Texas reflects the struggle between the Spanish, French and English for the possession of America. The earliest explorations were made by the Spanish, soon after the conquest of Mexico. In 1540 Coronado, in search of the famous Seven Golden Cities of Cibola, reached Ysleta, a Pueblo village on the Rio Grande. Two years later De Soto reached Texarkana, and in 1582 Espejo established a mission at El Paso. Upon these explorations Spain based its claims to the region north of the Rio Grande. The French entered into the contest for the possession of the territory when La Salle, in 1685, founded a colony on the shores of Matagorda Bay, and from 1712 to 1803 Texas was alternately under the control of France and Spain.

After the purchase of the Louisiana Territory from France in 1803, the United States claimed the territory to the Rio Grande, but in 1819, in the agreement with Spain whereby Florida was acquired, the claim was abandoned, and the Sabinas was made the southern boundary of the United States.

Americanization and Struggle for Independence. In 1821 Mexico gained its independence from Spain and Texas became a province of Mexico. The Americanization of Texas began in the following year, when Stephen F. Austin led a great immigration of United States citizens to Texas. By 1830 over 20,000 Americans had settled in the province, and Mexico not only forbade further immigration but began to persecute the American settlers. The Texans took up arms to defend themselves, and on March 2, 1836, the inhabitants of the province declared it a free and independent republic. On March 6 occurred the memorable Battle of the Alamo at San Antonio, where all of the Americans who had taken refuge in the old Spanish mission were killed. On April 21, 1836, Santa Anna, the Mexican President and general, was overwhelmingly defeated at San Jacinto by a small force of Texans under General Sam Houston. The independent government of Texas was then established, with General Houston as President.

Statehood. Afer a long controversy over the slavery question, Texas was admitted to the Union in March, 1845, on the conditions that the state should retain its unappropriated and vacant land; that new states not to exceed four in number might be formed within its boundaries; that the United States settle all questions of boundary with foreign countries. This last provision brought about a second war with Mexico in 1846 (see MEXICAN WAR). By the treaty of Guadalupe Hidalgo, February 2, 1848, the Rio Grande was definitely fixed as the southern boundary of the state.

In spite of strong Union sentiment, Texas joined the Confederacy and furnished 90,000 troops to the Southern armies. A new constitution abolishing slavery and renouncing states' rights was adopted in 1866, but it was not acceptable to Congress, and in 1867 Texas was placed under military government. Another constitution was adopted in 1869, and the following year the state was readmitted into the Union.

The growth and prosperity of the state have been remarkable, especially during the last twenty years. In 1900 much of Galveston was destroyed by a tidal wave, but the city has since been made safe by raising its level and by the construction of a great sea wall and a causeway between the island and the mainland. Disastrous river floods caused much loss of life and property in 1913. The public warehouse system for the storage of cotton was established in 1914 to relieve the critical cotton situation. In 1915 a resolution was introduced in the legislature providing for the creation of a new state to be called "Jefferson," in the northwest corner of Texas. As yet no definite action has been taken upon this matter. The adoption of woman suffrage was defeated in the legislature in the same year.

Other Items of Interest. On the Llano Estacado the air is so clear and dry that it is almost impossible to estimate distances. A man may set out to walk to a point which is apparently not more than five or six miles away, only to find hours afterward that it is still a score of miles distant. Mirages are of frequent occurrence.

Galveston, Texas, is often known as the "oleander city," for practically every yard and garden displays those beautiful flower-laden shrubs.

RESEARCH QUESTIONS ON TEXAS

(An Outline suitable for Texas will be found with the article "State.")

What are the "lost mountains" of Texas? What reason can you see for their being so called?

How does the highest point in Texas compare in altitude with the highest point in each of the bordering states?

Mention one important crop in the production of which Texas ranks first, one in which it ranks second, and one in which it ranks third.

How does the state compare with others in the extent of its artesian-well belt? What is the principle on which such a well operates? (See ARTESIAN WELL.)

What conditions laid down when Texas was admitted to the Union brought on war between the United States and Mexico? How?

Compare the cotton production of Texas with that of the chief cotton-growing countries with the exception of the United States?

Where is the Llano Estacado, and what is one of its peculiarities?

What are the "gushers," and where are they to be found? How does Texas rank among the states in the output from these gushers? How does it compare in amount produced with the leading states?

What and where is the Alamo, and what part did it play in the history of Texas?

Why is it a natural thing that every loyal Texan should revere the memory of Sam Houston?

How does the largest state in the Union compare in number of inhabitants with the largest city in the Union?

How many states surpass Texas in value of total crops?

How does the area of the coal fields of this state compare with the total area of each of the five chief coal-producing states? (See COAL.)

What two famous explorers of early times reached the territory now comprising Texas? For what was each searching?

What is the "Panhandle" of Texas?

How many constitutions has Texas had? When was the present one adopted?

Of what city is it said "If you want to die here you must go somewhere else," and what is referred to?

How does the largest state in the Union compare in size with the most populous? How do the two compare in population?

Which river of Texas is most important commercially, and which is most important historically?

How does the state rank in total railway mileage among the states of the Union?

What is the mileage to each hundred square miles of area?

What is the popular name of the state? Account for its origin?

How many rivers has Texas?

What does the name *Texas* mean, according to most authorities?

How does Texas compare in number and extent of cattle ranches with the other states of the Union?

Mention one manufactured product in which Texas ranks first and two in which it ranks second.

How is it possible that the United States may some time have forty-nine states, without enlarging its present boundaries?

What is the state flower?

Texarkana, as its name would indicate, is partially in Texas and partially in Arkansas.

The last fight in the War of Secession took place in Western Texas on May 13, 1865.

The climate in San Antonio and its environs is [illegible] that it has given rise among the inhabitants to the saying [illegible] want to die [illegible] somewhere else."

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

acres. Federal land grants were never a part of the endowment of the University of Texas. The university is organized into the colleges of arts, literature, science and engineering, education and medicine. [illegible] a department of journalism was added. The department of medicine is located at [illegible] and [illegible] the [illegible] Hospital. The [illegible] students [illegible] Texas. The university has a faculty of about 500 [illegible] and the student enrollment is over [illegible]. The library contains about [illegible] volumes.

[illegible]

[illegible]

[illegible]

[illegible]

Importance of the Industry. Textiles are made primarily for clothing, and have always been one of the leading classes of manufactures. In the United States the value of the products of all the allied textile industries is exceeded only by that of the iron and steel industry, in Canada only by that of foodstuffs, and in Great Britain and Ireland the products of the textile industry are greater than those of any other group. In the United Kingdom nearly 600,000 people are directly employed in the manufacture of textiles, and the number dependent, directly or indirectly, on the industry is seven or eight times as great. The annual output exceeds a value of $1,000,000,000. The textile industry of the United States employs nearly 1,000,000 people and has an annual output of $1,500,000,000 to $1,750,000,000. Beside these huge amounts the Canadian industry, with an average output of $150,000,000, is comparatively small.

Textiles in the Schools. The study of textiles in schools is of a double character. The child, and particularly the girl, in the elementary and secondary schools studies them chiefly from the viewpoint of the household arts or domestic economy. The technical processes of textile manufacture, on the other hand, belong more specially to industrial education. As yet the work in both branches has advanced little beyond the experimental stage. In many European countries, notably Great Britain and Ireland, Germany, Belgium, France, Norway and Sweden, training in all household arts has for many years been a recognized feature of the school system. In the United States and Canada the value of such training is being everywhere recognized, and courses are being instituted in schools and colleges; even if the work is elective and not required the entire field can be covered with degrees of thoroughness varying with the amount of time devoted to it.

The study of textiles is a branch of social science—in other words, one of those subjects which are designed to make children better fitted for daily life. The study of primitive textiles involves some study of the beginnings of civilization, for the barbarian hardly ever knew how to weave. The textile arts are then to be considered in their relation to the broad questions of clothing and shelter, and such other practical points as modern methods of manufacture, varieties of textiles, their value for various purposes and their prices. The adulteration of textiles is also an important point. The functions of textiles—that is, clothing—in health, beauty and ethics is a phase of the subject too difficult for young children, but even in elementary schools the care and repair of the wardrobe should be easily understood. Children in the higher grades and in secondary schools are capable of making many articles of clothing, and frequently of designing garments and household furniture.

In the ordinary school course textiles are studied from the standpoint of utility. To some extent this viewpoint is preserved in technical education, but the emphasis is laid on methods of manufacture. In the United States, for example, there are a number of schools, supported largely by large textile manufacturers and partly by the state, which turn out each year hundreds of skilled workmen familiar with the processes of manufacture and able to hold important positions in the mills. Noteworthy examples of such an institution are the Textile School at Philadelphia, and the schools at Fall River, New Bedford and Lowell, three great cloth-making centers in Massachusetts. The Pratt Institute at Brooklyn (N. Y.) and the Lewis Institute at Chicago offer similar courses. The more advanced work includes microscopic and chemical tests of the different fibers, dyeing and weaving, and pattern designing, besides the artistic and economic aspects of the industry. Many schools also offer normal courses for teachers. W.F.Z.

Consult Watson's *Textile Design and Color;* Barker's *Textiles;* Dooley's *Textiles for Commercial, Industrial and Domestic Art Schools.*

Related Subjects. Matter supplementary to this discussion of textiles may be found in the following articles in these volumes:

Broadcloth	Gauze
Brocade	Hemp
Calico and Calico Printing	Jute
	Linen
Cambric	Mohair
Canvas	Muslin
Chiffon	Plush
Cloth	Satin
Corduroy	Shoddy
Cotton	Silk
Crape	Taffeta
Cretonne	Tapestry
Crinoline	Tartan
Damask	Tweeds
Dimity	Velvet
Felt	Weaving
Flannel	Wool
Flax	Worsted

THACKERAY, *thak'er i,* WILLIAM MAKEPEACE (1811-1863), one of the three most celebrated English novelists of the English Victorian Age. He was born July 18, 1811, in Calcut-

ta, where his father was in the employ of the East India Company. He was sent, while still very young, to England to be educated. He spent several years at the Charterhouse School, which he afterward described in *The Newcomes,* and passed a year at Cambridge, where Tennyson was at the same time. His well-known humorous verses on *Timbuctoo* were written on the topic assigned for the year's prize poem, but were not intended as a burlesque of Tennyson's poem, which won the prize. An interval of travel on the continent followed, and then he settled down for a short time to study law—a subject, however, which failed to interest him.

WILLIAM MAKEPEACE THACKERAY
Of himself he said, "I have no brains above my eyes; I describe what I see." He gave the world a true picture of the society of his day.

From Art to Literature. In 1832 he came into possession of a considerable fortune, which was soon greatly lessened by the failure of an Indian bank and by an unfortunate investment. From his boyhood days he had been fond of drawing, like his own Clive in *The Newcomes,* and he went to Paris to study art; but he was soon convinced that he would never be successful enough at it to earn his living, which he now found himself obliged to do. He began, therefore, to write humorous tales and sketches, which were contributed largely to *Fraser's Magazine* and to *Punch.* Among the collections of these writings are *The Yellowplush Papers, The Irish Sketch-Book, Jeames's Diary* and the *Snob Papers.*

Fame Came with "Vanity Fair." In 1836 Thackeray married Miss Isabella Shawe, who bore him three daughters, of whom one died in infancy. In 1840, however, Mrs. Thackeray's mind failed, and her husband was finally forced to abandon hope of her recovery. Meanwhile, his work had been growing in popularity, and with the appearance, in 1846-1848, of the serially published *Vanity Fair,* he became famous. In this novel his intense hatred of sham and pretense is expressed in a satirical and wonderfully realistic picture of the life of the English upper class—a picture in which sordid desire for rank and wealth and snobbish deference to the possessors of these prizes are held up to ridicule and rebuke.

Not only casual readers, but those as well who should see more deeply, have often called Thackeray cynical, but that he never was—he was too clear-sighted and too kindly. Indeed, his very ridicule of insincerity and vain show is praise for the opposite virtues. *Vanity Fair* was followed by *Pendennis,* which is in a measure autobiographical; *Henry Esmond,* a most faithful representation of English life in the early eighteenth century, by many reckoned his masterpiece and by some the greatest of English novels; and *The Newcomes,* which by its pathos proves once and for all that Thackeray was no cynic. Colonel Newcome is one of the finest characters in all fiction.

In the year that *Henry Esmond* was published (1852), Thackeray gave further evidence of his keen insight into eighteenth century life in his lectures on *The English Humorists of the Eighteenth Century,* delivered in the United States. In 1855 he made a second tour lecturing on *The Four Georges.* These two series of lectures were published later, and are among the most delightful essays of the age. From 1860 to 1862 he was editor of the *Cornhill Magazine,* in which appeared his *Lovel the Widower, The Adventures of Philip, The Roundabout Papers* (a series of charming essays), and the first part of *Denis Duval,* left unfinished at the author's death. *The Virginians,* a sequel to *Henry Esmond,* published in 1857, is his only other really important novel.

His Place in Literature. It is the natural thing to compare Dickens and Thackeray, the two great humorous novelists of the age. Thackeray was a year older, but Dickens was the first to become popular, largely because of his energy and his self-confidence. Thackeray, on the other hand, was shy and sensitive all his life, and had always to drive himself to his work. The two were friends, without thought of jealousy; and by their pictures of English life, high and low, did an infinite service in making the England of their days live in the future.

Thackeray's style is remarkable for its ease and simplicity. As he says himself, he likes "occasionally to step down from the platform and talk about" his characters, and this familiar, colloquial manner is one of the chief charms of his writings. A.MC C.

Consult Crowe's *Homes and Haunts of Thackeray;* Benjamin's *Some Aspects of Thackeray.*

THALER, *tah'ler,* a large silver coin current in Germany from the sixteenth century until 1873. A few of these coins are still in circulation and are equal in value to three marks, or 71.4 cents. The thaler was first coined in 1519, in the Bohemian town of Joachimsthal, from which it received the early name *Joachimsthaler.* See MARK.

THALES, *tha'leez,* one of the Seven Sages of Ancient Greece and the founder of the earliest school of Greek philosophers, at Ionia in Asia Minor. He belonged to the period covering the first half of the sixth century B. C., and was a native of Miletus, in Asia Minor. He founded the geometry of lines, having learned the geometry of surfaces from the Egyptians, and was the first to apply that science to practical use in the measurement of the distance of ships at sea, the height of pyramids, etc. Much of his fame in his own day was the result of an accurate prediction of an eclipse. The philosophy of Thales was based on the theory that all things are composed of water, which, though false, was the origin of the later philosophies. See PHILOSOPHY.

THAMES, *temz,* THE, England's most important, though not its largest, river. Roman writers mention the *Tamesia,* and the name is probably a Celtic word, meaning *broad river.* It rises in Cirencester, in south-central England, and flows easterly for 228 miles to the North Sea. On its banks are Eton, Oxford, Henley, Windsor and many places almost equally interesting. The Thames is navigable for barges to within eighteen miles of its source, and lately it has been deepened at London until it is readily accessible to the largest shipping vessels. The tonnage of the imports and exports handled in London harbor in 1912 was 19,548,000, three-fourths of which was import, principally wool from Australia.

THAMES RIVER, BATTLE OF THE, also known as the BATTLE OF MORAVIANTOWN, in the War of 1812. It was the direct result of Perry's naval victory on Lake Erie, after which he sent to General William Henry Harrison the famous message, "We have met the enemy, and they are ours." Perry's victory gave the Americans control of Lake Erie, and made it necessary for the British to abandon Detroit. The British garrison under Colonel Proctor, accompanied by a force of 600 Indians led by Tecumseh, crossed into Canada, where they were pursued for several days by 3,000 Americans under General Harrison. Although outnumbered two to one, the British finally halted at Moraviantown, on the Thames River, in Kent County, Ontario, and on October 5, 1813, offered battle. Almost at the first volley Proctor and many of his men fled, but Tecumseh (which see) fell fighting on the battle field. The Americans burned Moraviantown the next day, and then marched back to Detroit. The death of Tecumseh, foremost of the Indian chiefs, broke the league of tribes which had been allied to the British, and practically ended the coöperation of the British and Indians on the northwest frontier. Proctor was afterwards publicly reprimanded by a court-martial and was suspended from his rank and deprived of his pay for six months.

THANE, a title of Anglo-Saxon origin, meaning variously a servant, attendant, retainer, or official, but always with a military significance. In old England there was a system of thanehood, quite similar to knighthood of later days; a freeman who was not of noble parentage might become a thane by acquiring a certain portion of land, by making three sea voyages or by taking holy orders. He was then recognized as a member of the territorial nobility, and his sons inherited his thanehood.

The thane had a vote in the local and general Witenagemot, or assembly. A thane of ordinary standing was sometimes known as "lord of the manor," while a successful thane might hope to become an earl. The king's thane was a member of his bodyguard, was therefore a personal attendant in war, and an important person, who had great freedom of social privilege; he was responsible only to the king for his deeds or behavior. On retiring from personal service to the king he was given a grant of land. There were other degrees of thanes, as bishop's thane, a thane's thane, etc. After the reign of Henry II the thane was not known in English history.

The thane was an important figure in story and verse of olden time. Shakespeare causes Macbeth to say (*Macbeth,* Act I, sc. 3), "I know I am Thane of Glamis;" and Stevens, in his notes, explains that the thaneship of Glamis was the ancient inheritance of the Macbeth family. Sir Walter Scott, in his *Lay of the Last Minstrel* (c. 5), makes the chief see—

> . . . in the thanedom once his own,
> His ashes indistinguished lie.

THANET, OCTAVE. See FRENCH, ALICE.

THANKSGIV'ING DAY, in the United States and Canada, a day set apart annually for the giving of thanks to God for the blessings of the year. Originally it was a harvest thanks-

Suggestive Program for Thanksgiving

The wee bird has its nest,
Safe in the tree so tall;
For birdlings' nest, for children's homes,
I thank the Lord for all.

Thanksgiving Hymn.....*Montgomery*

A Thanksgiving.....*Lucy Larcom*

Reading of the Thanksgiving Proclamation

When the Frost Is on the Punkin..*Riley*

Essay, *The First Thanksgiving*

Thanksgiving Day.....*Lydia M. Child*

Autumn Fires.....*Stevenson*

Essay, *The Pilgrims' Journey to America*

What the Wood Fire Said to the Little Boy.....*Frank L. Stanton*

The Pumpkin.....*Whittier*

Fable of the Ant and the Grasshopper

The Story of a Seed

Thanksgiving quotations

The Gift of Maize, from *Hiawatha's Fasting*.....*Longfellow*

Tableaux

- Puritans going to church
- The Puritan (Deacon Chapin)
- Priscilla and John Alden
- A Thanksgiving dinner in old New England
- The visit of an Indian chief
- Landing on Plymouth Rock

Song, *We Thank Thee*

giving, and while the purpose has become less specific, the festival still takes place late in the autumn after the crops have been gathered. Indeed, it is probably an outgrowth of the harvest celebrations of England.

The First Thanksgiving in the New World. In Plymouth Colony the first dreadful winter, during which almost half of the Pilgrim company died, had passed, and renewed hope had grown up with the summer. With the fall, the corn crop was gathered, and Governor Bradford decreed a day of thanksgiving. Great were the preparations—the few women in the colony spent days before boiling and baking and roasting; and even the children were busy turning the roasts on the spits before the open fires. As guests, there were more than fourscore friendly Indians, who brought as their share of the feast wild turkeys and venison from the woods. The tables were set out of doors, and the company sat about them as one big family. This first Thanksgiving, however, was not merely a feast—there were prayers and sermons and songs of praise; and three days had gone by before the Indians returned to their forest and the colonists to their tasks.

Later History. From Plymouth the custom spread to the other colonies, until in time the governor of each issued such a proclamation annually. During the Revolutionary War eight special thanksgiving days were observed after signal victories or wonderful deliverances from danger, and President Washington issued a general thanksgiving-day proclamation in 1789. In the same year the Protestant Episcopal Church in America announced the first Thursday in November as a regular annual day for giving thanks, "unless another day be appointed by the civil authorities."

But there was no uniformity. Some states had an annual thanksgiving, others did not, and no proclamation was issued by the President. One woman, Mrs. Sarah Josepha Hale, the editor of *Godey's Lady Book*, took an intense interest in the subject, and for twenty years sent out pleas through the columns of her journal for a nation-wide thanksgiving. Nor did she stop at this. She wrote letters to each of the Presidents; and finally, in 1863, her efforts were rewarded, for President Lincoln appointed the last Thursday of November as Thanksgiving Day. Thus Mrs. Hale won the title of the "Mother of Thanksgiving."

From 1863 the same day has been regularly set apart. The President annually makes a formal announcement, and the governors of the

various states issue proclamations calling on the people to give thanks. The day is not a national legal holiday—the United States has no legal holidays, not even the Fourth of July; but almost every state has legalized it, by legislative act. Throughout the country, but especially in New England where the custom originated, the day is looked upon with great reverence. It is peculiarly a family day, and the very sound of the name brings back inevitable memories of "back home;" of the old farmhouse kitchen and the pantry crowded with "good things."

Thanksgiving Day in Canada. The Dominion, too, has an annual Thanksgiving Day, which is celebrated in much the same way, with family reunions and religious services. It is proclaimed by the Governor-General as a harvest festival, and unlike that of the United States is not always set for the same day. Usually it falls in the last week in October, but if harvest is especially early, an earlier day may be appointed. It is not strictly a legal holiday, being dependent solely on the government proclamation. A.MC C.

Consult Sindelar's *Thanksgiving Entertainments;* Love's *The Fast and Thanksgiving Days of New England.*

THE'ATER, a building in which to view dramas and other spectacles. The modern theater consists mainly of two parts, the auditorium and the stage. The auditorium is for the accommodation of spectators and includes entrances and exits, stairs, offices and rooms necessary to the conduct of the theater and convenience of patrons. The auditorium is usually of horseshoe shape, with the floor sloping upward from the stage. Balconies, varying in number from one to four, are built in most theaters and follow the horseshoe shape of the auditorium. Immediately in front of the stage a place is provided for the orchestra.

The stage itself is reserved for the actors and the scenery, which, to meet the demands of modern audiences, must be extremely elaborate. Behind and at the sides of the stage are the dressing rooms for the performers. To handle the scenery and shift it into the changing positions demanded during performances requires the employment of a large number of men. Above the stage are the "flies," where the scenery is hung in pieces ready to be lowered into position on the stage, and below it is another space of sufficient depth to allow the scenery from the stage to be lowered into it. In modern theaters scenic effects can be obtained that only a few years ago would have been considered impossible. By mechanical means, horse races, chariot races, moving trains and steamboats are produced with great skill.

The lighting system of a modern theater is quite different from what it was fifty years ago. A complete system of electric lighting for the whole theater is now controlled by one or two men operating at a table at the side of the stage. Protection against fire is carefully provided for; to prevent the spread of fire from stage to auditorium theaters are now compelled by law to be provided with a fireproof curtain, made usually of iron in sheets or asbestos.

The price of seats in theaters varies considerably. In the time of Shakespeare seats in English theaters ranged from one penny (two cents) to one shilling (twenty-four cents); soon after the Revolutionary War the price of seats in American theaters was twenty-five cents for the gallery and $1 for box seats. In New York the usual price for orchestra seats to-day is $2 and $2.50; in Chicago, Boston, Philadelphia and other large cities it is from $1.50 to $2.00. This is more than is demanded for seats in Germany, where the best seats are never sold for more than $1.50. The principal London theaters demand $2.50 for the best seats.

Theaters are compelled to follow certain rules in building arrangements, to furnish a specified number of exits and to be provided with efficient fire-fighting apparatus. The neglect of these precautions has led to terrible disasters, notably the burning of the Iroquois theater in Chicago (1903), in which 575 were killed; Lehman's Theater, Petrograd (1836), in which 700 died; and the Ring Theater, Vienna (1881), in which 640 perished. At least five other theater fires have occurred in which more than 200 lives were lost.

According to law patrons of the theater may express their approval or disapproval of a performance in a moderate manner, but if doing so with intention to stop or interfere with the performance they are liable to forcible ejection.

Ancient Theaters. The first theaters of Greece were rude affairs built of scaffolding round a space in which the actors performed. As the drama developed, so did the theater. The collapse of a theater in 499 B. C. led to the building of more permanent structures, though it was not until many years later that stone buildings were erected. The theater of Dionysus in Athens, remains of which are still to be seen, was a work of the fourth century and was completed under the direction of the statesman

Lycurgus. The ruins of theaters which are to be seen throughout Greece are all greatly similar to the first theaters of Athens. Some of these were vast structures capable of accommodating from 10,000 to 40,000 spectators.

The Roman theaters closely resembled the Greek. The building was in the form of a

THE THEATER OF DIONYSUS
The oldest known theater in the world, capable of seating 20,000 people.

semicircle, not covered by any roof. While the Greek semicircle was often cut out of the side of a hill with the seats arranged in tiers up the slope, the Roman theaters were usually built on the level. The part which would now be called the auditorium was called the *cavea.* The stage was in Greek called the *proskenion,* from which the modern word *proscenium* is derived. The back of the stage, generally a blank wall supposed to represent any building before which the action of the drama took place, was called the *skene,* evidently the origin of the present-day word *scenery.* The space between the stage and the audience was then as now called the orchestra and was devoted to the musicians by the Greeks but in Roman theaters was occupied exclusively by the senators.

The immense size of the early theaters made it impossible for the actors to be heard by all the audience. Metal mouthpieces similar in principle to the megaphone were worn. The actors were all males, the parts of women being taken by young men. In more modern theaters boys and young men continued to play female parts until 1662; then manager D'Avenant, who introduced movable scenery into London theaters, also brought in the great innovation of allowing women to appear on the stage. F.ST.A.

Consult Moderwell's *The Theater of To-day;* Moses's *The American Dramatist;* Cheney's *The New Movement in the Theatre.*

THEBES, *theebz,* a splendid city of ancient Egypt, for centuries the seat of government of the Pharaohs. A few straggling villages now occupy the site of the once famous capital, which lay on the banks of the River Nile in Upper Egypt (see map on page 1969). On this site may be seen to-day some of the most impressive ruins that have been preserved from antiquity—ruins of temples, tombs, obelisks, avenues of sphinxes and colossal statues, extending along the river for nearly seven miles. To the north, on the eastern bank, in the little village of Karnak, are the remains of the celebrated temple erected in honor of the god Ammon. The gigantic columns of this edifice, the largest temple ever constructed, are illustrated here. The temple was built by several successive kings, including Seti I and Rameses II.

The village of Luxor, south of Karnak, contains the ruins of another impressive temple, built about the year 1500 B.C. by Amenophis III. Three of six colossal statues of Rameses II, carved from single blocks of black granite,

HALL OF COLUMNS, AT KARNAK
The obelisk in the distant center dates from 1600 B.C.

are conspicuous among the ruins of Luxor (see page 1971). At Thebes, too, was set up the colossal statue known as the "Vocal Memnon" (for description and picture see pages 3727 and 3728). Of this city one historian has written—

"In spite of all the ravages of time and of the barbarian, Thebes still presents the grandest, the

most prodigious assemblage of buildings ever erected by the hand of man."

Consult the *Bulletin of the Metropolitan Museum of New York,* issued in 1914.

THEBES, an ancient city state in Boeotia, head of the confederacy known as the Boeotian League, and at one time the supreme power in Greece. Thebes lay in the southeastern part of the country, about forty miles north of Athens and midway between Mount Helicon and the channel separating Boeotia and the island of Euboea. According to tradition it was founded by Cadmus, and there is a cycle of legends associated with the city that is almost as famous as the one connected with Troy.

The authentic record of Theban history begins with a controversy between Thebes and Plataea, toward the close of the sixth century B. C. Plataea then came under the protection of Athens, and refused to join the Boeotian League.

In 431 B. C. a Theban force made an attack on Plataea by night, an event that precipitated the long-threatening Peloponnesian War. During that conflict Thebes fought with Sparta, and it remained the latter's ally until Spartan cruelty and treachery made a further alliance impossible. Under the tyrannical rule of Sparta the Boeotian League fell to pieces, but between 379 and 374 B. C. it was revived by the patriotic efforts of Pelopidas, and in 371 B. C. the Thebans under Epaminondas wrested Grecian supremacy from the Spartans by the victory of Leuctra.

Theban supremacy came to an end with the death of Epaminondas in 362 B. C., and in the period that followed the exhausted and disunited Greek states came under the rule of Philip of Macedon and his ambitious son, Alexander the Great. When the latter ascended the throne the Thebans revolted, but their uprising was crushed and their city destroyed, no house being spared except that of the poet Pindar. Under Roman rule Thebes again became prosperous, but it declined under the Turks, and the site is now occupied by an unimportant country town—Thiva, or Rhiva—with a population of about 3,500.

Related Subjects. The reader is referred to the following articles in these volumes:

Alexander the Great	Epaminondas
Boeotia	Greece, subtitle *History*
Cadmus	

THEMISTOCLES, *the mis' toh kleez* (about 514-449 B. C), an Athenian statesman and soldier, one of the chief figures in the stirring times of the Persian wars. Nothing is known of his early life, but after the Battle of Marathon and the withdrawal of the Persians in 490 B. C. he became prominent as the rival of Aristides and the advocate of naval expansion for Athens. In 483 B. C. he succeeded in having Aristides unjustly banished and persuaded the Athenians to build ships and fortify their harbors, feeling certain that in case of renewed invasion by the Persians the conflict would be decided on the sea.

At the time of the Persian expedition in 480 B. C. he was the chief man in Athens and one of the most powerful statesmen in Greece. With patriotic surrender of his right as commander of the fleet, however, he consented to serve under the nominal leadership of the Spartan Eurybiades, though it was really Themistocles who brought matters to an issue favorable to Greece in the great battle of Salamis.

He was then more powerful than before, and did Athens good service by holding the Spartans in diplomatic parleyings until the walls of Athens were practically rebuilt, contrary to the express demands of the Spartans. His arrogance alienated the affections of the people, however, who began to credit rumors that he was not above treason if the bribes were sufficient, and some time before 471 B. C. he was ostracized. After remaining for a time in Argos, he fled to the Persian court and was assigned by the king of Persia a residence in Magnesia, where he lived in luxury until his death.

According to some accounts he committed suicide by taking poison. Though there remain against him suspicions of treason, he undoubtedly was in his day the savior of Greece, and by his naval policy laid the foundations for the future predominance of Athens in Greece.

Related Subjects. The following articles in these volumes will explain the references in the above study of Themistocles and give added information:

Aristides	Ostracism
Greece, subhead *The Period of Glory*	Persian Wars
Marathon	Salamis

THEOCRACY, *the ok' ra si,* a word derived from the Greek *Theos,* meaning *God,* and *kratos,* meaning *power,* and applied to a form of government in which God is believed to be the chief executive, and the laws are received as the commandments of the Invisible Ruler. In such a government the members of the priesthood act as interpreters and expounders of the laws and have authority in both civil and religious matters. The most notable theocracy was that of the Israelites, to whom the law was

given by God, through Moses, the Ten Commandments forming the basis of the covenant. The Puritan government of Massachusetts was also styled a theocracy, as it was for many years conducted on the principle of obedience to divine law.

THEOCRITUS, *the ok'ri tus,* a Greek poet, born either at Cos or at Syracuse. The dates of his birth and death are not known, but he seems to have done his best literary work between 285 and 275 B.C. He traveled widely, was on intimate terms with high officials of Egypt and Syracuse, and apparently led a life notable for honors and gifts. Thirty idylls, or pastoral poems, bear his name, but it is highly probable that several of these were written by other poets. This type of poetry, which he seems to have founded in Greek literature, consists of fresh, vivid descriptions of rural life, and is somewhat in the form of a simple drama with groups of musical shepherds alternately responding. The influence of Theocritus is seen in Vergil and in such modern poets as Tennyson, Swinburne, and Austin Dobson.

THEODOLITE, *the od'o lite,* an instrument for the measurement of horizontal and vertical angles, used in surveying. It consists of two graduated circles at right angles to each other, a telescope turning on axes mounted centrically to the circles and a scale for each circle carrying two or more verniers (see VERNIER). Each circle is fitted with a spirit level, to enable the operator to know when the instrument is absolutely level. The whole instrument is mounted on a tripod, the legs of which are pointed with steel. Though still used considerably in England, the theodolite has been practically abandoned by American engineers in favor of the transit. See SURVEYING.

THEODORIC, *the od'o rik* (about 454-526), king of the Ostrogoths, commonly known as THEODORIC THE GREAT. He was born in Pannonia, where his father, Theudemir, was joint ruler with his two brothers over the East Goths. When but seven years of age he was sent as a hostage to Constantinople, where he lived for about ten years. In 474 his father died and he became chief ruler, and at once began to threaten the Greek Empire and even Constantinople. He accomplished nothing, but the emperor constantly feared him and in 488 allowed him to proceed against Odoacer, in Italy. For over four years the contest continued, but in 493 Ravenna, where Odoacer had taken refuge, surrendered, and Theodoric's conquest of Italy was complete. The victor killed Odoacer with his own hands, despite the terms of the peace, and took the title of king of Italy.

From that time on Theodoric abandoned war almost entirely, and devoted himself to improving his country, which enjoyed under him a period of unexampled prosperity and peace. Taxes were lightened, agriculture was promoted, and the good will of the original inhabitants of the land sought in every possible way. Theodoric himself was a follower of Arianism, but he showed the broadest tolerance of Catholics until near the close of his reign, when he retaliated for Emperor Justin's persecutions of the Arians by permitting the execution of several leading Catholics. So great was his remorse for this deed that it is believed to have hastened his death. See GOTHS, subhead *Ostrogoths.*

TOMB OF THEODORIC

Erected about the year 530 by order of Theodoric's daughter. It may yet be seen at Ravenna, and is now known as the Church of Santa Maria della Rotonda.

THEODOSIUS I, *the o doh'shi us* (about 346-395), a Roman emperor, known as THE GREAT. He was born in Spain, and when little more than a boy was given a command in his father's army; but when his father was put to death he retired from service and lived quietly at home. In 379 Gratian chose him as his colleague, and gave him the Eastern provinces, including Thrace, Dacia, Macedonia and Egypt. The Goths were seriously menacing the empire, and it was the special duty of Theodosius to repel these invasions—a perilous task, but one which he successfully performed.

In 383 Gratian met his death at the instigation of a usurper, Maximus, who for five years ruled the Western Empire as colleague of Theodosius; but in 388 the latter overthrew Maximus and became sole ruler. He recognized the boy Valentinian, son of Gratian, as ruler of the West, and undertook a successful campaign to avenge his death at the hands of Arbogast. A revolt in Thessalonica in 390 roused Theodosius' wrath, and he took a cruel vengeance. The people of Thessalonica were invited to attend an exhibition in the circus, and when 7,000 or more of them had gathered the doors were closed and they were massacred by barbarian soldiers. As a punishment for this inhumanity Ambrose, bishop of Milan, refused Theodosius communion for eight months. Theodosius was zealous for the Christian faith, and ordered the destruction of all heathen temples throughout his dominions.

THEOPHRASTUS, *the o fras' tus* (about 372-287 B. C.), a Greek philosopher, born at Eresus, in Lesbos. He was a pupil of Plato and Aristotle in Athens; on the death of the latter he was made head of the Peripatetic School, and held this position from 322 B. C. until the time of his death. His work attracted a large following; he won fame in metaphysics, ethics, natural history and, especially, in botany. Most widely known are his *History of Plants* (nine books), *Theoretical Botany* (six books), and *On Mineralogy* (fragments of which still remain). He also wrote sketches entitled *Characters,* which won the distinction of being imitated during the eighteenth century.

THEOSOPHY, *the os' o fi,* a system of occult teaching transferred from India by the efforts of Madame Blavatsky and her followers. See OCCULT; BLAVATSKY, HELENA.

THERAPEUTICS, *ther a pu' tiks,* the science of healing disease. It includes every known mode of treatment except the knife (see SURGERY), and may be considered under six divisions—*medical, general, electrical, mental, bacterial* and *preventive.* Medical therapeutics includes treatment by drugs; general therapeutics, treatment by water, sunlight, dieting and massage; electrical, by the X-ray and other forms of electric current; mental, by suggestion, direction of the mental attitude, etc.; bacterial, by the use of antitoxins, vaccination, serum, etc.; preventive, by the application of the principles of sanitation and hygiene.

For a detailed discussion of the various phases of healing see the articles listed at the close of MEDICINE AND DRUGS, DISEASE and HYGIENE.

THERESA, *te re' sah,* also spelled **TERESA,** SAINT (1515-1582), was a Spanish nun, a patron saint of Spain. She was born at Avila, in Old Castile, and studied in an Augustinian convent, where she was so stirred by the tales of the ancient holy martyrs that she determined to seek martyrdom for herself. In 1533 she entered a Carmelite convent, and though she frequently deprecated the lack of severity and asceticism in the discipline of the Order, she made for many years no special attempt to introduce reforms. The reading of Augustine's *Confessions,* however, combined with the death of her father and certain supernatural visitations, or trances, to waken in her an intense spirituality, and she began to feel that it was her duty to restore the Carmelite Order to its original rigidness of rule. With a few followers, therefore, she withdrew and set up a new convent where her ideas might be put into force. Opposition to her plan was strong, but the Pope sanctioned it, and finally the general of the Order invited her to introduce her reforms into the other convents. She opened new houses everywhere in Castile and even beyond its boundaries, accomplishing wonders by her unaided efforts.

For years after her death at Alva in 1582 several cities contended for her body, and since the power of working miracles was supposed to inhere in her bones these were carried to various places. She was canonized by Gregory XV in 1622. Despite the visions which those hostile to her in her own day laid to devil possession, but which succeeding generations have interpreted as special signs of the divine favor, she was a woman of the utmost wholesomeness of mind and of much practical wisdom. She wrote an autobiography, several mystic treatises, and left a large number of letters.

Consult *Saint Theresa,* edited by Cardinal Manning; Jameson's *Legends of the Monastic Orders.*

THER'MAL SPRINGS, or **HOT SPRINGS,** springs whose waters are warmer than the surrounding air. A thermal spring with water at the boiling point, which spouts into the air at varying intervals, is called a *geyser* (which see). There are also quiet springs which have boiling waters. At the other extreme is the pool at a high altitude whose water is of a higher temperature than that of the surrounding region, but only a few degrees above freezing. It is in volcanic regions that springs having the highest temperature are found, and in such cases the water is heated by flowing over

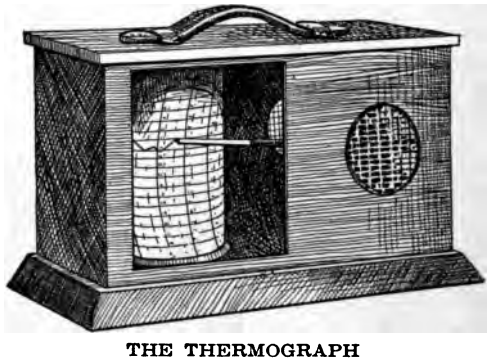
beds of uncooled lava or by coming in contact with hot rocks. Hot springs in nonvolcanic regions are probably caused by the circulation of water at great depths in the earth before it reaches the surface. Many mineral springs are hot springs. See MINERAL WATERS; SPRING.

THERMOELECTRICITY, *ther'mo e lek tris'i ti,* the electric current set up in a circuit of two or more unlike metals, or in a circuit of one metal the different sections of which are in unlike physical states, when one of the points of contact is heated or cooled. As electrical energy may be transformed into heat and light, so heat and light may be changed into electrical energy. This may be shown by connecting an iron wire with a German-silver wire and attaching the loose ends to a galvanometer. When the joined ends are heated or cooled, the needle will show a responsive movement. If bismuth and antimony be substituted for iron and German-silver, the effect will be still more marked. Since their electromotive force is greater than that of any other two readily obtainable metals, antimony and bismuth are used in constructing the thermoelectric pile.

This pile, or battery, is constructed of alternate bars of antimony and bismuth soldered together, and is so sensitive to changes in temperature that it makes a very excellent substitute for a thermometer. As long as both faces have the same temperature, there is no current, but the slightest variation sets up a flow of electricity. This change may be almost infinitely small. There is, for example, enough heat in the body of a fly walking across one face of the pile to deflect the needle of the galvanometer. It is obvious that such an instrument is useful for detecting the most minute changes in temperature. This peculiar action of metals of different heat-conducting powers in starting electric currents was first observed by Seebeck in 1822.

See ELECTRICITY, and the various related subjects there named.

THERMOGRAPH, *ther'mo graf,* an instrument which automatically makes a record of changes of temperature. A standard pattern, shown in the accompanying illustration, is provided with a spiral coil of metal which unwinds with a rise of temperature and winds up when cooled. These movements are recorded by a long needle carrying a pen, which traces a corresponding zigzag line on a revolving paper sheet moved by clockwork. Degrees of temperature are marked off on this sheet by vertical divisions, while hours of time are designated by horizontal distances. Usually the paper is prepared to receive the record of one week, and when the period is completed the



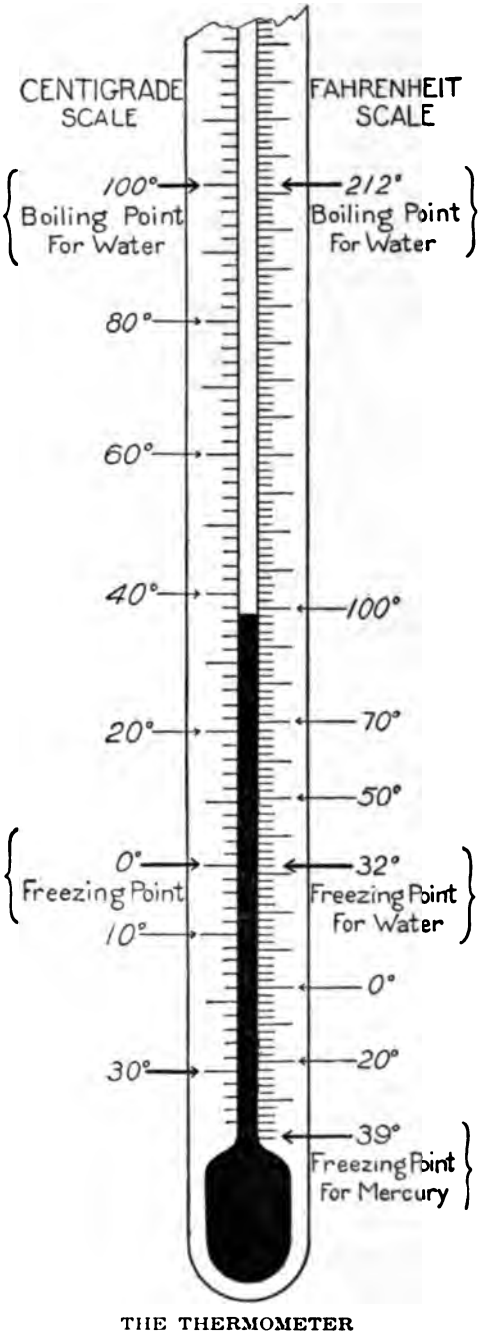
THE THERMOGRAPH

sheet is removed and a fresh one put in its place.

THERMOMETER, *ther mom'e ter,* an ingenious instrument for indicating temperature, one of the most useful applications of the law that bodies expand on heating and contract on cooling. There are various forms of thermometer, but the one in most common use consists of a glass tube, with a bulb of mercury or alcohol at the lower end. An increase in temperature causes the liquid to rise in the tube, and the point to which it rises is shown on a scale placed on or back of the tube. As the liquid in the tube has practically the same temperature as that of the surrounding air, the degree of temperature can be accurately read by noting the height to which the mercury or alcohol rises. There are three standard scales—the Fahrenheit, Centigrade and Reaumur—but only the first two are in general use. The Fahrenheit (abbreviated F.) scale has 180 divisions, extending between 212° and 32° above zero. These limits are respectively the boiling and freezing points of water. On the Centigrade (C.) the freezing point is marked 0°, and the boiling point 100°. This scale is used very generally in scientific calculations. The Reaumur scale has 0° for the freezing point and 80° for the boiling. For rules for changing Centigrade readings into Fahrenheit and vice versa, see CENTIGRADE.

How a Thermometer Is Made. The glass tubes used for thermometers are constructed so that expansion and contraction will be equal throughout the length, and before being accepted they are thoroughly tested. When a tube is found to be satisfactory, a bulb is blown at one end of it, and the opposite end is worked into a funnel shape. A little mercury is in-

serted through the funnel mouth, while the bulb is gently heated to expel the air. When the bulb is full and sufficient liquid extends above it the funnel end is closed. The closed tube is then immersed in melted ice, the point to which the liquid in the bore drops is observed, and a marking made, thereafter known as the freezing point of water (0° C. or 32° F.). The instrument is then immersed in water and slowly heated until the water boils. Another mark is made at 212° F. or 100° C. The intervening space between the freezing point and the boiling point is subdivided according to scale desired, and the thermometer is ready for use. B.M.W.



THE THERMOMETER

Showing gradings for both Fahrenheit and Centigrade scales. Comparison of the two scales is thus made easy.

THERMOPYLAE, *ther mop'i le,* meaning literally the *hot gates,* is a mountain pass of Greece. The mention of it is sufficient to stir in any hearer's mind thoughts of deeds of heroism, for it was here that Leonidas and his followers displayed their unexampled bravery. The pass, which leads from Thessaly into Locris, lies between Mount Oeta and the Maliac Gulf, and was anciently the only way by which an army might pass from northern into southern Greece. As it was but fifty feet wide it was easily defended by a comparatively small force, and was thus one of the important strategic points in the country. When, in August, 480 B.C., Xerxes with his vast hordes of Persia attempted the invasion of Greece, Leonidas, king of Sparta, was sent with 300 Spartans and some 5,000 allies to hold the pass of Thermopylae. For two days the Persians tried in vain to force a way through, even the famous Immortals being turned back, but at evening of the second day a treacherous Greek, Ephialtes by name, showed to Xerxes a path over the mountains, and the Persians were enabled to cross and fall upon the Greek rear. Dismissing at the approach of the enemy all his followers except the Spartans and Thespians, Leonidas prepared to fight to the death, and every Spartan fell.

Two hundred years later (279 B.C.) another invader, Brennus the Gaul, tried to enter Greece through the famous pass. He, too, was held at bay until a way was discovered over the mountains, but this time the Greek defenders managed to escape.

Some of the features of the ancient pass remain unchanged; the hot springs which gave it its name still bubble forth at the foot of the hill and are of value in certain diseases. The pass itself, however, no longer exists, for deposits of the river Spercheius have broadened it to a marshy plain which is in places three miles wide.

Consult Grundy's *The Great Persian War.*

Related Subjects. In connection with this article the reader may consult these topics:

Greece, subhead *The Period of Glory*	Persian Wars
Leonidas	Sparta
	Xerxes

THER'MOS BOTTLE, a device for keeping substances either hot or cold. It is based on the principle that heat is transferred by the process of conduction, and that placing a nonconducting body next to a substance causes that substance to retain its heat or prevents outside heat from reaching it.

The thermos bottle consists of a double glass container enclosed in a metal case. The inner glass vessel is fused to the outer after the air between them has been thoroughly exhausted, and the vacuum thus created acts as a nonconductor. Hot liquids poured into the container keep hot because heat cannot flow out across the vacuum, and cold liquids remain cold because outside heat cannot reach them. A cork closes the mouth of the bottle, and a screw cap seals the opening of the metal case. In the bottom of the case there is a spring upon which the container rests.

Theoretically, the contents of the bottle should remain hot or cold, as the case may be, indefinitely, but practically the limit of temperature stability is not more than twenty-four hours. Automobile tourists and picnickers find the thermos bottle a great convenience. The various patterns, which are marketed under different trade names, sell for $1.25 to $5.

THESEUM, *the'se um*; among the Greeks, the name given to any temple erected in honor of Theseus. A particularly celebrated one which existed in Athens in ancient times contained what was supposed to be the body of

THE THESEUM

Theseus, and was ornamented with paintings and sculptures showing his deeds. No trace of it remains, and its exact site is uncertain. There still exists, however, a famous and beautiful structure which is called the Theseum, though it was undoubtedly a temple to some god. This, it is true, bears sculptures showing scenes from the life of Theseus, but it has an equal number from the life of Hercules. This temple, the best preserved in Greece, is of Pentelic marble, in the Doric style, and stands at the foot of the Acropolis. The interior to-day bears little resemblance to that of a typical Greek temple, for it was changed many centuries ago when the building was used as a Christian church.

THESEUS, *the'se us,* a famous legendary king of Athens, whose marvelous exploits formed themes for Grecian poets, and whose wise and benevolent rule established the original power of Athens. He was the son of Aegeus and Aethra, and was brought up in seclusion by his mother until he became a man. Then he removed the heavy stone which his father had placed over the sword and sandals by which he was to recognize his son, took his legacy and proceeded to Athens. Arrived there, he found his father much under the influence of his wife Medea, who when she saw Theseus recognized as heir to the king, tried to poison him. Upon the failure of her attempt she fled in her dragon car to Media, never to return.

When Theseus learned of the terrible tribute Athens was compelled to pay to Minos, king of Crete, he volunteered to go as part of the sacrifice for that year and, if possible, to kill the Minotaur, whose savage lust for human flesh had to be gratified. Aegeus pleaded in vain, and Theseus set sail in the black-sailed vessel for Crete. He killed the Minotaur, with the aid of Ariadne, the king's daughter, and with her and his joyous companions set sail for Greece. As a punishment for his crime in deserting Ariadne on the return home, Theseus was made to forget to change his vessel's sails from black to white, the agreed sign of the success of his expedition, and in consequence suffered the loss of his father, who killed himself.

On his arrival at Athens he was proclaimed king and entered at once on the beneficent policy which made the city great. After years of prosperous rule, however, he became cruel and overbearing, and was driven by his people into exile. Too late they realized how great a man he had been; and they brought back his remains to the city and buried them in a beautiful temple where the hero was worshiped as a god.

Consult Harrison's *Mythology and Monuments of Ancient Athens.*

Related Subjects. The reader is referred to the following articles in these volumes:

Ariadne	Minos
Athens	Minotaur

THESSALONIANS, *thes a lo'ni anz,* EPISTLES TO THE, two New Testament epistles written by

Paul from Corinth, between 52 and 54 A.D., to the Church in Thessalonica, in Greece, which he had recently organized. The first was written for consolation and encouragement at a time when the Church was suffering persecution from the Jews, and the second to correct the disorder that resulted from an exaggerated belief in the early coming of Christ.

THESSALY, *thes'a li,* a district in Northern Greece, in ancient times the largest of the historic divisions of that country. It is an extensive plain, enclosed on all sides by mountains, which form an irregular square, each side of

LOCATION MAP
Thessaly is the black area.

(*a*) Epirus
(*b*) Aetolia
(*c*) Locris
(*d*) Phocis
(*e*) Boeotia

which is about sixty miles in extent. On the north side is the Cambunian range, on the south, Mount Othrys; the majestic Pindus chain forms the western boundary and separates the country from Epirus; Ossa and Pelion, on the east, shut it off from the Aegean Sea. Mount Olympus, the fabled abode of the gods, rises on the northeast to a height of nearly 10,000 feet. The plain of Thessaly is drained by the river Peneus (the modern Salambria), which finds an outlet to the sea in the northeast through the beautiful Vale of Tempe, between Ossa and Olympus.

Among the various sections into which Thessaly is geographically divided, the region to the southeast, on the Pegasaean Gulf (the modern Gulf of Volo) is of special interest because of its association with ancient myth. From there Jason led the Argonauts in quest of the Golden Fleece, and it was the birthplace of the great Achilles. Near the modern Volo is the site of Iolcus, around which cluster many legendary tales. Thucydides is authority for the statement that this region was the early home of the Hellenic race.

The fertility of the soil of Thessaly was a powerful incentive to invasion by tribes from beyond the mountains, and during the period between the heroic and historic eras, this region was the scene of various migrations. The invaders who permanently occupied the country reduced the original inhabitants to the position of serfs, and themselves instituted a landed nobility centered in the cities. Almost unlimited power lay with a few great families, and the cities maintained only a semblance of union, except when they combined in a common cause. When occasion demanded a uniting for war they chose a commander-in-chief who was known as the *tagus.* Their chief strength was in their cavalry; the plains were adapted to the raising of horses, and the Thessalians bred the finest in all Greece.

Only occasionally did the Thessalians enter actively into the affairs of Greece as a whole. In the fourth century B.C., however, united under Jason, the able tyrant of Pherae, they began seriously to threaten the rest of Greece, and were checked only by the assassination of their leader. Thessaly passed under the control of Macedonia in 352 B.C., through the conquest of Philip of Macedon, and was subject to that country until the Roman Flaminius, by the victory of Cynoscephalae, in 197 B.C., made Macedonia a dependency of Rome. Thessaly remained a Roman province until the fall of the Eastern Empire, after which it was dominated successively by the Venetians and the Turks. During the Greek war for liberation, which ended in 1827, the southern part was freed from Turkish rule, and the greater part of the region was united with Greece in 1881 through the intervention of the Great Powers. Thessaly was the chief battle ground in Greece during the war with Turkey in 1897.

At the present time Thessaly comprises the nomes, or departments, of Phthiotis, Larissa, Karditsa, Trikkala and Magnesia, having a combined population of about 575,000. The great majority of the inhabitants are Greek. Volo, the one important port, is a town of over 23,000 inhabitants, and maintains daily steamboat communication with Athens. A railroad connects Volo with Larissa, on the Salambria

(Peneus), a town of about 18,000 inhabitants, and several other lines are distributed throughout the region.

Thessaly has an annual wheat crop of over 4,000,000 bushels, and it yields large quantities of ore and earths. B.M.W.

Consult Wace and Thompson's *Prehistoric Thessaly.*

Related Subjects. The reader is referred to the following articles in these volumes:

Jason	Philip II
Olympus	Tempe, Vale of

THET'FORD MINES, a city in Megantic County, Quebec. It is the center of the world's richest asbestos mining district. Thetford Mines is on the Quebec Central Railway, seventy-six miles southwest of Quebec. Aside from the asbestos mines, the city is of little interest, its only important industrial establishments being sawmills, sash and door factories and foundries. Population in 1911, 7,261; in 1916, estimated 8,500.

THE'TIS, in Grecian mythology, one of the sea nymphs, wife of Peleus and mother of Achilles. See MYTHOLOGY.

THIERS, *tyair,* LOUIS ADOLPHE (1797-1877), a French statesman, historian and President of the republic, who proved his ability and patriotism at one of the most trying times in the history of his country, at the conclusion of the Franco - German War. He was born in Marseilles and educated for the law, but finding a literary and journalistic career much more to his liking, in 1818 went to Paris to write for the *Constitutionnel.* His Liberal tendencies led him to undertake a *History of the French Revolution* in ten volumes, the last of which was published in 1827. This became extremely popular, despite the fact that like all of Thiers' work it was open to the charge of inaccuracy and unfairness. The *Nationnel,* a paper established by him in 1830 as an opposition organ to the government, had much to do with the Revolution of 1830 which placed Louis Philippe on the throne.

LOUIS ADOLPH THIERS
The first President of the present republic of France.

Under the new monarchy Thiers became a member of the Chamber of Deputies, and between 1832 and 1836 held various offices in the Ministry, much of the time being virtually Prime Minister. He resigned in 1836, but in 1840 again became Premier, only to be driven from office by the king's attitude toward his policy of favoring Mehemet Ali in his conflict with Turkey. For some years then he devoted himself to literary affairs, chiefly to his *Consulate and Empire,* but when the Revolution of 1848 broke out he supported it and favored the establishment of a republic. Louis Napoleon suspected him, and had him banished in 1851, but allowed him to return the next year.

His speeches in the Chamber of Deputies constantly called attention to the unenviable position of France among the nations and so did much to bring on the Franco-German War, but he opposed that struggle and throughout it labored zealously to gain from the other European powers aid for his country. With the defeat of France his opportunity came. He was made "chief of the executive power" in the provisional government and brought about peace with Germany. With great vigor, too, he put down the war of the Commune, and in August, 1871, for his services he was declared President for three years. The indomitable spirit and will which had enabled him to help his country in its extremity had won for him enemies, and by 1873 the opposition had become so pronounced that he resigned. From 1876 until his death he was an influential member of the Chamber of Deputies. A.MC C.

See, in this connection, FRANCO-GERMAN WAR; also FRANCE, subtitle *History,* relating to the period; GERMANY, subtitle *History,* descriptive of the period of the war of 1870-1871, the Franco-German conflict.

THIRST, that sensation by which the body announces its need of water. It is one of the *common* sensations, as distinguished from the *special* (see SENSES, SPECIAL), and is thus in the same group as hunger, pain and fatigue. Because the mouth and throat feel dry when one is thirsty, the sensation seems to be a local one. As a matter of fact it is general, for it can be satisfied by injecting fluids into the tissues or veins or by absorption of water through the skin; on the other hand, moistening the mouth without taking water into the system affords only momentary relief.

Water is absolutely essential to the maintenance of life. It forms almost three-fourths of the weight of the body and is found in all its organs and tissues. While it is taken into the body every day through the process of eating,

for practically all foods contain water, health is benefited by the copious drinking of this liquid. Authorities advise the person in normal health to drink six or eight glasses a day. If regular habits of drinking water are cultivated and persisted in, a healthy thirst can be created, and this should be the aim of every one. Such a thirst makes the individual a water drinker in cold as well as in hot weather, when every one drinks freely to offset the loss occasioned by the increase of perspiration. The unnatural thirst that accompanies fever, diabetes and various other diseases is caused by rapid reduction of the body fluids. C.B.B.

THIR'TY TY'RANTS, a committee from the aristocratic party at Athens, appointed by the Spartans when they gained supremacy after the Peloponnesian War. They were given dictatorial power in all matters in the state, and under the brilliant but unscrupulous Critias plotted to establish their rule permanently, installing at Athens a Spartan military governor and garrison. They disarmed all the citizens except their own adherents and put to death many wealthy members of the opposing party. In 403 B. C., after about a year of this reign of terror, the old democracy was restored.

THIRTY YEARS' WAR, the last of the great religious wars of Europe. It was really a series of conflicts covering the period between 1618 and 1648. Beginning as a civil war in Germany between the Protestant and Roman Catholic parties, it dragged into it one by one most of the nations of Europe, and ended as a general struggle for territory and political power.

Causes. The underlying cause of the war was the old, deep-seated hostility between the German Protestants and Roman Catholics, intensified by the different ways in which they interpreted the Treaty of Augsburg (1555), especially with reference to Church property. Both parties violated the treaty whenever they had an opportunity.

The Outbreak in Bohemia (1618-1623). In 1608 the Protestants began to get ready for the inevitable clash by organizing the Evangelical Union. The Catholics retaliated with the Holy League. It needed only a special provocation on either side to bring matters to a head. That came when the Archbishop of Prague, the capital of Bohemia, ordered the destruction of a church which the Protestants had begun to build. In anger the people appealed to the king, Ferdinand II. But he was an ardent Catholic and ignored their protests. The majority of the populace were Protestants, and they took this as the signal for revolt. The event with which it began is known in history as the Defenestration of Prague. (*Defenestration* is from the Latin word for *window.*) It was an old Bohemian custom for the people to punish offending officials by throwing them out of a window, and this treatment the mob applied to two of the king's ministers. This act precipitated the civil war that had so long been threatening.

At first the Protestants met with success. They drove out the Jesuits and elected Frederick, the Palatine elector, as their king. But soon the fortunes of war began to favor the other side. Their own Evangelical Union held back its support out of jealousy, for Frederick belonged to the Calvinists, whereas the Union was strongly Lutheran. To make matters still worse for the popular cause, Ferdinand II—a member of the powerful Austrian House of Hapsburg—was made Holy Roman emperor shortly after the revolt started, which naturally put new power into his hands. He was thus able to win an overwhelming victory at the Battle of the White Mountain, after which he sent his hosts throughout the length and breadth of Bohemia and the Rhine country, to pillage and destroy, until the insurrection was thoroughly stamped out. In the end the Bohemian Protestants were deprived of the special religious privileges they had enjoyed, and Catholicism once more became the religion of the land.

The Danish Period (1625-1629). With things at such a pass in Bohemia, it was natural that the other Protestant states should begin to look to their own security and consider the necessity of checking the ambitions of their zealous emperor. It was the king of Denmark, Christian IV, who took the first step. Enlisting the aid of one or two other states, and helped by a subsidy from England, he opposed Ferdinand's forces in Saxony. But the emperor had received unexpected assistance from a Bohemian noble named Wallenstein, who raised an immense army of adventurers and foreign mercenaries. This army he placed at the emperor's service without expense, the understanding being that they were to take payment by plundering as they went. Such an arrangement naturally meant untold suffering for the German people, and brought about tragedies that are remembered even to-day, after three hundred years, in the tales the peasants tell their children. This army, and the force of the Holy

League under the great general Tilly, defeated the Danish king, who withdrew after signing the Peace of Lübeck (1629). Even before that the emperor had issued the Edict of Restitution, in accordance with which all Church lands and possessions acquired by the Protestants since the Peace of Augsburg must be returned to the Catholic side. Here was a sure source of further friction.

The Swedish Period (1630-1635). The "Lion of the North," Gustavus Adolphus, the great hero-king of Sweden, now entered the combat. He had two motives for interfering: his sincere devotion to Protestantism; and his ambition for Sweden, whose position on the Baltic would be endangered if the emperor succeeded in his plans. This was the first introduction of the political element. In 1630, therefore, Gustavus Adolphus sailed with 16,000 men—the best trained and disciplined army in all Europe. He tried to relieve the city of Magdeburg, under siege because of resisting the Edict of Restitution, but arrived too late to prevent its capture. The sacking of the city was so frightful a catastrophe that Tilly compared it to the fall of Troy and Jerusalem. However, the Swedish army defeated Tilly's forces in the Battle of Breitenfeld (1631), and later in another conflict in which Tilly was killed.

Emperor Ferdinand was now forced to recall Wallenstein, previously dismissed, and another nondescript army from all over Europe gathered together. It met the Swedish forces in the famous Battle of Lützen (1632). In a thick mist that covered the field with darkness Gustavus Adolphus lost his way and somehow met his death; and the spot where he fell is now marked by a splendid monument which the Germans have erected in gratitude to the illustrious prince who saved the Protestant cause. The Swedes won the day and continued the struggle, with varying success, under the Chancellor Oxenstierna. At about this time the emperor, seeing cause to suspect Wallenstein of treason, had him assassinated.

Swedish-French Period (1635-1648). The war now lost the religious character entirely and became purely political. Richelieu, the real ruler of France at this time, was a Catholic, but he determined to interfere in behalf of the German Protestants as a means of blocking the growth of Hapsburg power, for France and Austria had been enemies for hundreds of years. In fact, he had assisted Gustavus Adolphus with influence and supplies. In 1635 he adopted direct tactics and flung a French army into Germany. This force united with the Swedish army, and under the brilliant leadership of Turenne and Condé, then just winning their spurs, as well as the Swedish generals Torstensson and Wrangel, a long series of victories was achieved.

The Peace of Westphalia (1648). The people had long been crying for peace and relief from the misery this dreadful war brought upon them. In 1645 the European powers sent representatives to a peace conference, the Catholic and Protestant delegates meeting separately in two different cities of Westphalia. Things dragged along until finally, in 1648, the news that the Protestant armies were planning operations against Vienna brought certain concessions from the emperor which made possible the agreement known as the Peace of Westphalia.

Effects of the War. Pitiable indeed was the condition of Germany at the close of the war. More than half the population had been killed, and the survivors saw nothing but ruin wherever they looked. Whole cities, villages and farms had disappeared; two-thirds of the property had been destroyed. Wild animals that had been driven out as the country became civilized had returned to the wilderness which war recreated. Art and science, commerce and agriculture were dead. There had been no time to educate the children. Thirty years of fighting had brought a general drop in moral standards, and attracted to Germany, as well as developed within Germany, vicious characters from whom the country suffered for many a decade. A.MC C.

Consult Schiller's *History of the Thirty Years' War in Germany.*

Related Subjects. In connection with this discussion of the Thirty Years' War, the following articles in these volumes may be consulted:

Ferdinand (Holy Roman Empire)
Germany, subhead *The Thirty Years' War*
Gustavus, subhead *Gustavus II*
Lützen, Battles of
Magdeburg
Reformation
Richelieu, Cardinal
Tilly, Count of
Wallenstein
Westphalia, subhead *Peace of Westphalia*

THISTLE, *this''l,* the name applied to a widely distributed group of plants bearing sharp spines or prickles. They are members of the composite family and are mostly weeds. Of the numerous species the most troublesome is the so-called *Canada thistle,* described and illustrated in these volumes on page 1138. Thistle plants have tough, fibrous stems, much-divided, prickly leaves, and soft, silky flowers of various colors, usually borne in round heads that form

large downy seed balls after the blossoms wither. The seeds are scattered far and wide by the winds, and so thistles multiply rapidly. They also produce vigorous rootstocks, and the complete uprooting of the plant is often a difficult matter. Fragments left in the soil may cause the growth of new plants. The eradication of thistles from grain fields is thus a serious problem. Annual species must be cut down before the flowers bloom.

THE THISTLE

It is supposed that the plant adopted by the Scotch as their national emblem is the species known as *cotton thistle,* so called because it has a covering of white down. Various other species, however, have been given this honor. A number of plants similar to thistles are sometimes called by that name. Conspicuous among these is the *Russian thistle,* or *tumbleweed,* a spiny-leaved plant of the goosefoot family that has caused farmers in Western United States much trouble.

THISTLE, ORDER OF THE, a royal order of Great Britain, conferred only upon peers of Scotland. Frequently a considerable antiquity is claimed for it, but according to trustworthy records it was founded in 1687 by James II. It was dedicated to Saint Andrew and bears the alternative title of Order of Saint Andrew. At the time of the revolution of 1688 the order lapsed, but Queen Anne revived it in 1703, and to the eight knights companions who with the sovereign made up its original membership four more were added. In 1827 the number of knights companions was fixed at sixteen, and no subsequent change has been made. The thistle is prominent on the badge and collar of the order, which has as its appropriate motto *Nemo me impune lacessit* (No one injures me with impunity).

THISTLE-BIRD. See AMERICAN GOLDFINCH.

THOMAS, *tom'as,* AUGUSTUS (1859-), a foremost American dramatist, author of several plays that show his mastery of the technique of the drama. Notable among these are his *Alabama, Arizona* and *In Mizzoura,* which also illustrate his fondness for using local color, and *The Witching Hour,* which deals with the power of hypnotism. Thomas was born in Saint Louis, Mo. Before he became a playwright he had a varied career as page boy in Congress, law student, employee in a railroad freight house, newspaper writer, and editor and proprietor of the Kansas City *Mirror.* His first play, *Alabama,* was successfully produced in 1891, and thereafter he gave his whole time to dramatic work. In 1915, after the death of Charles Frohman, who was lost on the *Lusitania,* Thomas became art director of the Frohman theatrical enterprises. Among his plays not mentioned above are *The Man Upstairs, Mrs. Leffingwell's Boots, The Harvest Moon, As a Man Thinks* and *Rio Grande.*

THOMAS, GEORGE HENRY (1816-1870), an American military leader who gained the title "The Rock of Chickamauga" for his steadfastness in one of the most desperate battles of the War of Secession. In that battle his unflinching courage saved the Union army from total defeat (see CHICKAMAUGA, BATTLE OF).

GENERAL THOMAS

Thomas was born in Southampton County, Virginia. After his graduation at West Point, in 1840, he fought in the Mexican War, served as instructor at the national Military Academy, and for five years commanded (as major) the Second Cavalry in Texas. When the War of Secession began he remained loyal to the Union, though a Southerner by birth, and early in the war was conspicuous at the Battle of Mill Springs, during the siege of Corinth, and at Perryville and Stone River. It was in September, 1863, that he became a Union hero through his gallant conduct at Chickamauga. Soon after this he was made commander of the Army of the Cumberland. When, in December, 1864, he crushed Hood's army at the Battle of Nashville, Thomas was promoted to be major-general in the regular army, and given a vote of thanks by Congress. During the rest of the war he commanded the Military Division of the Tennessee. General Thomas was one of the most reliable officers in the Union army, and he was thoroughly trusted both by his soldiers and by his superior officers, not only for his skill but for his sterling character.

THOMAS, SAINT, one of the Twelve Apostles, commonly referred to as *Doubting Thomas,* because he was loath to believe that Christ had indeed been raised from the dead (*John* XX, 24-29). His Greek name, *Didymus,* by which he was also known, means *twin,* but there is no mention in the Scriptures of a brother, though tradition has attempted to make Thomas the twin of Christ's brother James. Matthew, Mark and Luke tell nothing of Thomas beyond his name in the lists of Apostles, but John, in the verses above referred to, adds an account of the circumstances which won for him his name.

Of Thomas' later history the *Acts of the Apostles* makes no mention, but tradition makes him a missionary to Parthia or, according to other accounts, to India. This later, or Indian, legend declares that he suffered martyrdom at Mount Saint Thomas, near Madras, in what is now Southeastern India, and certain churches in India which date from the early years of the Christian Era, and which have most remarkably retained their identity through all the centuries, call themselves "Thomas Christians" and claim him as their founder.

THOMAS, THEODORE (1835-1905), an American orchestra conductor, born at Esens, in Hanover, Germany. His musical training was received mainly from his father, and at the age of ten he began to give public violin concerts in Hanover. A few months later he emigrated to America, played with various New York orchestras for two years, and then accompanied Jenny Lind as a violinist on her first American tour. In spite of his ability as a musician life was a bitter struggle for him for some years, and he himself declared that there were many times when he was so nearly frozen that he could not finger the violin upon reaching the orchestra pit.

In 1861 he began the formation of a great orchestra, and within three years had raised it to such a standard that he was invited by patrons of music in New York to give concerts there. By 1869 the organization was known throughout the world, and was in constant demand for tours of the larger American cities. Thomas accepted the directorship of the Cincinnati College of Music in 1878, but failed to find there the scope of work he desired and two years later again went to New York. He became conductor of the Brooklyn Philharmonic Society, and once more showed his qualities as an inspiring leader by the skill and finish developed in the organization.

In 1890 he went to Chicago, where again he established one of the greatest orchestras of the world. For years there was annually a heavy deficit, but Chicago music patrons gladly paid the debts incurred in presenting music of so noble a standard. Thomas absolutely refused to present music of a low type, and he lived to see audiences able to appreciate his musical ideals. In 1904 a recital hall costing $750,000 was erected in Chicago especially for his orchestra, but within a few months of its completion overwork exhausted him and he died early in the next year. His successor was Frederick Stock.

THOMAS À KEM'PIS (about 1380-1471), a religious writer, reputed author of *Imitation of Christ,* one of the most famous devotional books ever written. He was born at Kempen, in the Lower Rhine District, of a family whose name was Hemerken, was given a good education and about the year 1400 entered the Augustinian monastery of Mount Saint Agnes, near Zwolle. In 1413 he was ordained a priest, and thereafter lived in quiet at Mount Saint Agnes, becoming subprior in 1425. He wrote *Meditations on Christ's Life, The Soul's Soliloquy* and *Garden of Roses,* but these are practically unnoticed because of the greater fame of his *Imitation of Christ,* which has passed through many hundred editions in all languages. There is still, it is true, some controversy about the authorship of this work, but it is almost universally accredited to Thomas à Kempis. A manuscript copy of it in his own hand exists, but this is not positive proof, as all monks were zealous copyists of good books.

This book, which has been more widely read than any other religious writing except the Bible, grew out of the author's monastic life, and aims to give counsel to all who are seeking the path to righteousness. Thomas à Kempis, whose piety seems to have been of the most genuine and humble character, finds the root of all good in love, the root of all evil in lack of it. People of distinction and power in every age since his own have been profoundly moved by the book; Luther, Samuel Johnson, George Eliot and Lamartine are but a few of those who have admitted their indebtedness to it.

Consult Scully's *Life of the Venerable Thomas à Kempis;* Kettlewell's *Thomas à Kempis and the Brothers of the Common Life.*

THOMPSON, DAVID (1770-1857), a Canadian explorer, the first white man to follow the course of the Columbia River from its source to its mouth. Thompson was an Englishman

by birth, and was educated at Oxford University, but he deserted the university, at the age of nineteen, to enter the service of the Hudson's Bay Company in Canada. For some years he was a clerk for the company, but after 1797, when he became an employee of the Northwest Company, he gave practically all of his time to exploration. In 1798 he discovered Turtle Lake, one of the sources of the Mississippi River. Four years, 1807 to 1811, he spent in the valley of the Columbia, and for ten years, 1816 to 1826, he worked on the Canada-United States boundary survey. Later he had charge of various surveying and exploring expeditions in the Canadian Northwest.

THOMPSON, DENMAN (1833-1911), an American actor who endeared himself to a nation with *The Old Homestead,* a homelike play with a rural setting, was born at Beechwood, Pa. When he was seven years of age his parents moved to New Hampshire. The typical New England life he saw there influenced his entire career, for all of Thompson's success as a player centers about the humorous New England character, Joshua Whitcomb, created and acted by him for so many years. Thompson cared little for school and at the age of seventeen ran away with a circus, in which he served as an acrobat for a year. He then returned home and tried to be content in the mercantile business, but the lure of the stage was too strong, and in 1853 he joined a theatrical stock company at Worcester, Mass.

For some years he played unimportant parts in Canada, the United States and England, but it was not until 1875 that he gained favorable notice. During that year he wrote *Josh Whitcomb,* a sketch showing the peculiarities of the old-fashioned New England farmer, and this was so successful that in 1876 he enlarged it into a play of the same title and produced it in Chicago. This was still more happily received, and Thompson presented it in nearly every state of the Union. In 1887 he again enlarged and revised the story, and this comedy under the name of *The Old Homestead* was enthusiastically received at its first performance in New York. Since that time it has not missed a season on the stage. Thompson wrote another successful play, *The Sunshine of Paradise Alley,* but he will be remembered mainly for the one vivid character he gave American drama.

THOMPSON, JAMES MAURICE (1844-1901), an American writer, best known as the author of *Alice of Old Vincennes,* a romantic novel of Revolutionary days. This entertaining and well-written story—his best literary achievement—was published the year before his death, and was the culmination of a group of writings that included poems, literary reviews, books on nature and a treatise on archery. Always a lover of outdoor sports, he was an enthusiast on the subject of the bow and arrow. Thompson was born in Fairfield, Ind., but spent most of his boyhood in Georgia and Kentucky, and while still a youth enlisted in the Confederate army.

After the war he returned to his native state, settling in Crawfordsville. There he engaged in law practice and civil engineering and at the same time began his career as a writer. He became a regular contributor of the New York *Independent* in 1883, and for fifteen years was a member of its editorial staff, writing a large portion of its book reviews. His style was fresh and unconventional, and his books bore testimony to an enthusiastic love of nature and out-of-door life. Thompson's writings include, besides his *Alice of Old Vincennes, Hoosier Mosaics, The Witchery of Archery, Songs of Fair Weather, By-Ways and Bird Notes, The Boy's Book of Sport, The Ethics of Literary Art* and *My Winter Garden.*

THOMPSON, SIR JOHN SPARROW DAVID (1844-1894), a Canadian jurist and statesman, Premier of the Dominion from 1892 until his death. Sir John became Premier, as successor to Sir John J. C. Abbott, at a time when the Conservative party was showing signs of disintegration. He planned many reforms, not merely for the party but for the Dominion, but he died before he could put many of these into effect. Sir John was a quiet man, who never advertised himself or his deeds, but he stands forth as a man of solid and honest achievement.

Thompson was born at Halifax, N. S. There he received a common school education, studied law in a barrister's office, and was called to the bar in 1865. From the first he took an active interest in political affairs, and in 1877 was elected to the Nova Scotia assembly. A year later he entered the provincial cabinet as attorney-general and in 1882 became premier of Nova Scotia. He held office for only a few weeks, resigning to become chief justice of the provincial supreme court. In 1885, however, he again entered politics, was elected to the Dominion House of Commons, and accepted the place of Minister of Justice in the Macdonald Cabinet. In 1887 he was legal adviser to the British representatives who negotiated the Fish-

eries Treaty with the United States, and in 1893, while Premier, he was one of the arbitrators of the Bering Sea Controversy. Sir John died at Windsor Castle, where he had just taken the oath as a member of the Privy Council. Queen Victoria in 1887 conferred on him the honor of Knight Commander of the Order of Saint Michael and Saint George (K. C. M. G.).

THOMSON, JAMES (1700-1748), a Scottish poet, born at Ednam, Roxburghshire. He studied at the University of Edinburgh, where he was to prepare himself for the ministry. This purpose he gave up, however, and after moving to London, began at once to produce poetry. During the next four years appeared successively the poems that compose his *Seasons,* a work that became immediately popular and was revised and expanded in 1744. In 1730 he started on a two years' tour of Europe as tutor of Sir Charles Talbot's son and upon his return was given by his patron, then Lord Chancellor, a position which made practically no demands on him but brought him £300 a year.

This income ceased with the death of Talbot in 1737, but in the following year Thomson was granted a pension and in 1744 was made surveyor-general of the Leeward Islands. In the year of his death appeared *The Castle of Indolence,* in which he attempted, with much success, to reproduce not only the form but the spirit of Spenser's *Faerie Queene.* Among his other writings are the tragedy *Tancred and Sigismunda* and *The Masque of Alfred,* in which occurs the famous *Rule Britannia.* Some critics declare that the honor of the latter composition should be shared with other writers of the day, and that it was not entirely his own. The poems of Thomson have a peculiar interest because they were the first to show the change from devotion to mere form, as in the classical age, to a free and natural treatment of the beauties of nature.

THOR, *thawr,* the thunderer, in Northern mythology, the eldest son of Odin and the strongest of the gods, their champion in the almost incessant wars against the giants. As a child Thor was noted for his size and great strength. Ordinarily he was a good-natured boy, but sometimes he fell into such terrible passions that his mother was unable to control him, so she gave him into the charge of foster parents, who brought him up very wisely. When he had grown to maturity he built in Asgard a wonderful palace which he named Bilskirnir (lightning). Thor was especially the god of peasants and the laboring classes, and in the 540 halls of his great palace he met his favorite dead and feasted with them, as Odin did with their masters.

Thor's wife was Sif, whose chief attraction was her long, golden hair, which covered her from head to foot like a veil. One morning Sif awoke and found her beautiful hair all gone. Thor, who admired it excessively, vowed that he would punish the thief most severely. He suspected Loki as the culprit, and having followed him through numerous changing forms, at last captured him and compelled him to admit that he had taken Sif's golden hair. Thor, however, consented to let the traitor go if he would procure a new head of hair as beautiful as the first.

At once Loki proceeded to the realm of the dwarfs, where he begged Dvalin to make the hair, and at the same time prepare presents for both Odin and Frey, whose anger he wished to disarm. For Odin the dwarf made the famous spear which never failed in its aim, and for Frey the ship which sailed over land as well as water, and then he spun from the finest gold thread the long tresses which were warranted to grow luxuriantly again as soon as they touched the head of Sif. The skill with which this was done led to wagers being laid among the dwarfs, and as a result of their competition they made many other magic things which the gods afterwards possessed. They made the enormous boar with its golden bristles for Frey, the magic ring of gold from which, every ninth night, eight similar rings dropped; and a magic hammer which came back to the hand that threw it. This last gift was for Thor. The hammer was always red hot, and even the handle was so heated that the god was obliged to wear an iron gauntlet in order to use it. Besides this, Thor possessed a magic girdle which doubled his strength whenever he drew it around his body.

As Thor rode about the heavens in his brazen chariot drawn by two goats, from whose teeth and hoofs sparks were constantly flying, the lightnings flashed from his hammer, and as he threw it through the air the thunder roared. In art Thor is represented as a man in the prime of life, tall, well formed, with bristling red hair and beard and strong, muscular limbs. Thursday is Thor's day. A. MC C.

THORACIC DUCT, *tho ras'ik dukt,* one of the main tubes of the lymphatic system, or the network of vessels carrying the fluid (lymph) from which the body cells obtain nourishment. It is the great trunk which receives the lymph

from the lower limbs and chyle from the intestinal tract. This duct, which is about the size of a goose quill and from fifteen to eighteen inches long, begins below in a dilated portion called the receptacle of the chyle, and extends up along the front of the spinal column to the seventh vertebra of the neck; there it curves forward and downward, opening into the junction of the left jugular and left subclavian veins (see color diagram opposite page 1388). See also LYMPH, subhead *The Lymphatic System.*

THOREAU, *tho'ro,* or *tho ro',* HENRY DAVID (1817-1862), an American writer on nature, born at Concord, Mass., of Scotch and French descent. His father had been a merchant, but had taken up the manufacture of lead pencils, an occupation which Thoreau also followed at times. He was graduated from Harvard in 1837, and in the same year began his lifelong habit of keeping a journal. For several years he taught school at Concord and on Staten Island, N. Y., and delivered lyceum lectures in New England. Meantime he took a boating trip with his brother on the Merrimac River, and his description of this outing, with his reflections by the way, later made up his first volume—*A Week on the Concord and Merrimac Rivers.* One thousand copies were printed, but only about two hundred were sold, and the rest were sent back to the author, who used to say thereafter, "I have now a library of nearly nine hundred volumes, over seven hundred of which I wrote myself."

HENRY D. THOREAU

A Life of Seclusion. In 1841-1843 and 1847-1848 Thoreau lived with Emerson; but part of the interval between he spent at Walden Pend, near Concord, where he enjoyed a sort of hermit's life. He wished to prove his doctrine that a man could live naturally, earn what he needed, and have large leisure for study and culture. His home, which he built with his own hands, cost him twenty-eight dollars; he lived very frugally, supported himself by odd jobs of surveying and boat building, visited among his neighbors, read widely in several languages, wrote for magazines and kept a journal which he later revised and published under the title *Walden, or Life in the Woods.* This book, probably his best work, shows few discoveries, but proves its author to have been a minute observer. His familiarity with the creatures of the woods was nothing short of remarkable; the birds came when he called, the animals showed no fear of him, even the fish he could lift from the water with his hands.

Thoreau spent most of his life, after leaving Walden, with his parents and sister at Concord, and in tramping trips in the Maine woods, about Cape Cod and in Canada; and his later works are but repetitions, with variations, of his earlier ones. His style is original and stimulating, and his writings, neglected for a time, are taking higher and higher rank. He wrote some verse, which has the charm of force and originality, but which lacks warmth and melody.

Unusual Character. There has been much discussion as to Thoreau's character, his admirers holding that his independence and uprightness of spirit set him far above ordinary men, his detractors declaring that his difference from those about him was mere self-conscious eccentricity. It is true that he indulged in many vagaries. He refused to vote, to attend church or to pay taxes, thus registering his protest against what he felt was an artificial life. He was not a hermit in the true sense of the word, however, for he had many valued friends. His bold public defense of John Brown proved that he did have, at times, an interest in others besides himself. A.MC C.

Consult Rickett's *The Vagabond in Literature;* Channing's *Thoreau: The Poet-Naturalist.*

THO'RIUM, a heavy metallic element, the dioxide of which, called *thoria,* is used in the manufacture of the mantle of the Welsbach burner. The element, which was discovered in 1828 by Berzelius, a Swedish chemist, is a gray powder which burns with a bright flame when heated in air; it occurs in monazite, orangite, thorite and similar minerals. Thorium has a wide distribution, though it occurs nowhere abundantly. Brazil, Norway and North and South Carolina are important sources of supply. The monazite sands of North Carolina are extensively used by manufacturers of thoria for utilization in the gas-mantle industry. Thorium is one of the radioactive elements (see RADIOACTIVITY).

THORN APPLE. See STRAMONIUM.

THOROLD, *thawr'old,* a town in Welland County, Ontario. It is on the Grand Trunk

and the Niagara, Saint Catharine's & Ontario railways. These connect with the Michigan Central, Wabash, Pere Marquette and Canadian Pacific railways. Thorold's importance is chiefly due, however, to the Welland Canal, whose newest channel is cut through the town. The coming of the canal is responsible for a rapid growth since 1911. Population in 1911, 2,273; in 1916, estimated, 5,001.

Thorold is in the northern part of the Niagara Peninsula. It is four miles from Saint Catharine's, eight miles by electric trolley south of Niagara Falls and twenty miles north of Port Colborne. Thorold has one of the largest paper mills in the world, and is also a manufacturer of pulp, fiber board, abrasives, knit goods and smelted silver. Electric power is derived from Niagara Falls, and also from abundant natural gas in the vicinity. The town was founded in 1792, and was named for Sir John Thorold (died 1815), of Syston Park, England. Sir John is best known as one of the greatest of English book collectors. The town was incorporated in 1875, and until recent years had a slow growth. It is historically interesting as the site of the Battle of Beaver Dam, in which Laura Secord played a conspicuous part.

THOROUGHWORT, *tho'ro wurt.* See BONESET.

THORWALDSEN, *tawr'wawld sen,* BERTEL (1770-1844), the foremost sculptor of Denmark, and one of the greatest of modern times. Like the great Italian artist Canova he was the exponent of classicism (see SCULPTURE, subhead *Italy*), but he followed the Greek ideal more closely than his famous contemporary, and his works suggest, more than those of any other sculptor of his day, the serene beauty and purity of ancient Greek masterpieces. At the age of eleven Thorwaldsen began his art studies in the academy of Copenhagen, his birthplace. When he was twenty-three he won a gold medal and a scholarship which permitted him to study in Rome. Here his work received generous recognition from Canova, especially the plaster cast of a colossal *Jason with the Golden Fleece.* His first important commission (1803) was an order to reproduce this noble statue in marble, and, having once gained a reputation, he advanced rapidly in fame and fortune.

Among the famous works which he executed within the next few years were a frieze entitled the *Entry of Alexander the Great into Babylon* (in honor of Napoleon's expected visit to Rome), and the model for the *Lion of Lucerne,* a memorial to the Swiss Guards who died in defense of the royal palace at Versailles. This latter was copied by the Swiss sculptor Ahorn when he chiseled the sleeping lion out of the solid rock at Lucerne (see picture on page 3530 accompanying the article LUCERNE). In 1819 Thorwaldsen returned to Copenhagen, and was greeted there with a reception that was a personal triumph. During a brief sojourn in the city he received a commission to decorate the *Church of Our Lady,* and among the figures executed for this purpose is a colossal *Christ* that will always be regarded as one of his masterpieces.

Returning to Rome, Thorwaldsen made for Saint Peter's a monument to Pope Pius VII and executed many other important commissions. In 1825 he was elected president of the Accademia di San Luca, an honor not usually accorded to a Protestant. The last two years of his life were spent in his native city, and all his possessions were left to that municipality for the establishment of the Thorwaldsen Museum. In this institution are preserved the plaster models or originals of all of his sculptures, besides many other art treasures. His influence on contemporary and later artists was far-reaching, and he had a large share in bringing about the classic revival of the nineteenth century. Among his important works, besides those already mentioned, are *Cupid and Psyche, Memorial to Baroness Schubart, Four Seasons* and the medallions *Morning* and *Night.* R.D.M.

THOTHMES III, *thoth'meez,* or *toht'maze,* called THE GREAT, a king of ancient Egypt, under whom the country came to the zenith of its prosperity. Through a long series of wars he subjugated Syria, Palestine, part of Mesopotamia—almost all the territory, in fact, from the Nile to the Euphrates. On the walls of the great temple at Karnak he had vainglorious accounts of his campaigns inscribed, erasing the names of earlier rulers to make room for his own. He built many temples, using in that way much of the wealth ravaged from his subject territories, and he erected the famous obelisks known as Cleopatra's Needles, one of which stands now in Central Park, New York, and another in London. The dates of his reign are uncertain, but it seems that he came to the throne about 1538 B.C. and died about 1485 B.C. His mummy, like those of Seti I and Rameses II, was discovered in 1881 at Deir-el-Bahri.

THOUGHT, *thawt.* The mind is a storehouse furnished with bits of knowledge which are either innate or have been gathered by ob-

servation, reading and reflection. Thought is the blending, or weaving together, of these bits of knowledge into new and abstract ideas. For example, we may perceive a particular object, such as the Mississippi River, and observe its color and current, or remember when it was discovered, but when we piece together the products of our observation and reading and concentrate our attention upon some particular attribute of the river, such as its importance to commerce, or its relation to other rivers, we are said to *think* or to arrive at our conclusion by processes of *thought*. The observation of an object is often unconscious and performed involuntarily, but thought, or the singling out of a particular attribute of the object, requires conscious effort. We think only when we have some purpose, such as that of discovering likenesses and differences. Oliver Wendell Holmes says that "a thought is often original though you have uttered it a thousand times. It has come to you over new routes by a new train of association."

The psychologist seeks to discover *how* we think. He divides the powers of the mind into *feeling, intellect* and *will,* each of which is more or less represented in every mental act. Every thought is accompanied by a certain amount of feeling and is colored by it, while the will controls thought. The poet Lowell says:

> All thought begins in feeling—wide,
> In the great mass its base is hid,
> And narrowing up to thought stands glorified
> A moveless pyramid.

Similarly there is thought in all emotion, and here again the controlling agency is the will. Further, there are both thought and feeling in every act of will. The first step in the process of thought is *analysis,* or *abstraction,* which is the singling out of the characteristics and qualities of an object and the concentration of the mind upon one of these. The next step is known as *synthesis,* or the combining and relating of the qualities of a certain thing to those of other objects, and comparing them to determine their likenesses or differences.

This concentration of the mind always involves a muscular tension and an adjustment of the nerves and muscles, especially those controlling the movements of the eyes and head, and intense thought cannot be maintained for long periods at a time without physical exhaustion.

The logician is interested, not in the processes of thought, but in how to think *correctly,* and divides thought into three stages: first, the formation of a general idea which he calls *conception;* then the combination of concepts to form a statement, or judgment, and, lastly, the passing from one judgment to another, or the process of reasoning and drawing a conclusion.

Method and concentration are required to produce clear thought. Writing and conversation constitute the harvesting of thought. Not only do they enable us to give our ideas definite form, but they suggest new ideas and open new channels of thought.

> "Thoughts shut up want air
> And spoil like bales unopened to the sun."

The influence of thought upon character is incalculable, for thought is the impelling force of every deed. "As a man's thoughts are, so is he" is a saying so old and well known as to scarcely need repeating. It is thought that distinguishes man from animal and civilization from barbarism, and it is thought that has produced the moral, scientific and economical development of the world. W.F.R.

Consult Tichener's *Experimental Psychology of the Thought Processes;* Pillsbury's *Psychology of Reasoning.*

Related Subjects. In connection with this article on thought the reader is referred to the following articles in these volumes:

Apperception	Judgment
Association, Law of	Logic
Attention	Memory
Brain	Mind
Concept	Perception
Feeling	Psychology
Imagination	Reason
Interest	Will

THOU'SAND ISLANDS. See SAINT LAWRENCE RIVER, subhead *Thousand Islands.*

THRACE, *thrays,* the ancient name of an extensive region in the Balkan Peninsula. Its boundaries were somewhat vague, as it was subject to constant change, but it was situated to the north of Macedonia and possessed rich meadows and corn lands and had also great mineral wealth. At one time the territory is supposed to have extended from Macedonia to the Danube and eastward as far as the Black Sea.

The Thracians were of Indo-European origin, akin to the Phrygians of Asia Minor. They were barbarians, warlike and fond of plunder, and were ruled by many petty kings. After having been made nominally dependent on Persia the Thracians were subdued by Macedonia about 399 B.C. They regained their independence for a short time on the fall of Macedonia, but were conquered by the Romans, and Thra-

cia became a Roman province. Its most important towns were Abdera, the birthplace of Democritus; Sestos, on the Hellespont, celebrated in the story of Hero and Leander; and Byzantium, on the peninsula now occupied by Constantinople. Greece is generally supposed to owe the foundation of its music, mythology and philosophy to Thrace.

THRASH'ER. See BROWN THRASHER.

THRASH'ING MACHINE (also spelled THRESHING MACHINE). The thrashing engine ranks next in importance to the harvester among agricultural machines, and since the middle of the nineteenth century there has been about as much improvement in the one as in the other. The modern thrashing machine is a combination of three machines—the thrasher, the winnowing machine and the stacker—which are united in a single frame that is mounted on wheels so that the machine can be moved from field to field. The thrasher consists of an iron cylinder called the *beater,* to which vertical teeth are attached in rows, and a *concave,* which is a section of a similar cylinder with the teeth on its inner surface. These are so adjusted that they nearly touch the teeth of the cylinder. A feed board or grain conveyor receives the grain before it passes to the cylinder, and just back and a little below the cylinder is a grate, consisting of parallel steel slots against which the thrashed straw is forcefully thrown. Most of the grain falls through the slots to the grain conveyor, while the straw carrier, which has a vibratory motion for shaking out the remaining grain, conveys the straw to the stacker.

The grain conveyor carries the grain to the winnowing machine, where the grain is separated from the chaff and made to pass through a series of screens of different meshes to remove the inferior kernels and the seeds of weeds. The cleaned grain falls into a cylindrical box under the screens, called the *augur,* from which an elevator takes it to the weighing and measuring device. The grain may be placed in sacks or loaded into wagons as it comes from the machine. The stacker consists of a long tube connected with a blowing machine, which forces the straw up to the stack.

A modern thrashing machine requires a twelve or fifteen horse-power engine for its successful operation, and it will thrash from 1,200 to 1,500 bushels of wheat in a day. A machine with a grain conveyor cuts the bands and separates the grain in the bundles ready for the beater, so that bundles may be thrown directly from the stack or loaded upon it. The grain thrashed and cleaned pours from the elevator in a stream which fills bushel measures as fast as a man can empty them into a wagon.

Formerly steam engines were employed for operating thrashers, and a type that burned straw was very common in the great wheat-growing regions, but these engines are being replaced by internal-combustion engines.

In regions where the grain can dry on the stalk the combined harvester and thrasher, described in the article REAPING MACHINE, is used.

The most recent type of machine is that invented by Curtis C. Baldwin of Kansas. The machine goes to the grain instead of having the grain brought to it. As it moves through a field of standing grain, it blows a blast of air from revolving fans against the stems, forcing them against a toothed cylinder that beats out the grain and deposits it in a trough. Augurs elevate the grain to a second toothed cylinder, which beats it anew. The chaff is blown out, and the clean grain falls into sacks. Four horses pull the machine across the field, and a small gasoline engine operates the blasts and the beating devices. Two men are all that are required to operate it. The straw is left standing in the field, to be plowed under as fertilizer.

History. We read in the Bible that the Hebrews thrashed their grain by spreading it on hard ground or a floor and driving oxen over it. The Egyptians used a sort of sledge which was hauled over the grain, and the Greeks and Romans employed methods similar to those of older nations. The flail (which see) came into use in Northern Europe in the Middle Ages, and it was in general use among the early settlers of America until it was replaced by the thrashing machine. The thrasher, after which all later machines have been patterned, was invented by Andrew Meikle, a Scotch mechanic, in 1786. W.F.R.

Consult Conner's *Science of Threshing;* Davidson and Chase's *Farm Machinery and Farm Motors.*

THREAD, firmly-twisted fibers of cotton, flax or silk. Because of its cheapness cotton is more extensively used in the manufacture of thread than either silk or flax, and the long-fiber sea-island variety is the most valuable for the purpose. The supremacy of cotton in this field dates from 1794, when Samuel Slater began the manufacture of cotton thread in Pawtucket, R. I.

The process is very complicated. After the fibers are cleaned they are combed in carding machines until the tangles are smoothed out;

then they are rolled over and over to form thick coils of soft yarn. These coils are then placed in the drawing frame, where they are passed between sets of powerful rollers; in these rollers the cotton is drawn out and compressed into thin ribbons. These are fed to another machine, the doubling frame, where they are compressed into fine, delicate strips. Next, the strips are lapped, again drawn out, recarded to eliminate unevenness or other imperfections, and then wound upon bobbins. Several strands are twisted together and retwisted into a coarse cotton yarn, and this is finally spun by several progressive operations into the finished thread. The latter is either bleached or dyed, and is then wound on wooden spools for marketing. See COTTON; SPINNING.

THREE RIVERS, or, in French, **TROIS RIVIÈRES,** a city in Quebec, county town of Saint Maurice County. Three Rivers is situated on the north bank of the Saint Lawrence at its confluence with the Saint Maurice River. It gets its name from a third river, the Becancour, which empties into the Saint Lawrence from the south a short distance below the city. It is on the Canadian Pacific and Grand Trunk railways, ninety-five miles northeast of Montreal and eighty-seven miles southwest of Quebec. The famous Shawenegan Falls, twenty-three miles north, supply power for the city's manufacturing plants. These produce lumber, paper, iron pipe, machinery and tools of various kinds, and boots and shoes. Population in 1911, 13,691; in 1916, about 19,000.

Three Rivers is one of the oldest settlements in Canada. It was founded in 1634 by Laviolette, a lieutenant of Champlain. In 1775, at the beginning of the Revolutionary War, it surrendered to the Americans under Montgomery, and in the next year was the scene of one of the British victories which practically ended the possibility of adding a fourteenth to the thirteen revolting colonies.

THRIFT. This word, whether applied to plant life, individual human beings or to nations, means a substantial and vigorous growth. The word has no exact synonym. Frugality, development, prosperity—each conveys a shade of meaning that is a portion of thrift, but the word means more than any of these and includes them all.

Thrift is a condition—a condition implying both growth and progress. As applied to the individual, it is a habit that rises to the dignity of a virtue, for it not only adds to the material welfare of those persons who practice it, but it is contributary to the development of a strong and worthy character. We find it embodied in the philosophy of many of the world's most profound thinkers. In Holy Writ we find definitions of thrift that are applicable to modern times. For example:

He becometh poor that laboreth with an indolent hand, but the hand of the diligent maketh rich.

He that gathereth in summer is an intelligent son; but he that sleepeth in harvest is a son that causeth shame.

A rich man ruleth over the poor and the borrower is a servant to the man that lendeth.

Go to the ant, thou sluggard; look on her ways and become wise.

Cicero said, "Economy is of itself a great revenue." An old Latin proverb declared that "No gain is more certain than that which proceeds from the economical use of what you have." A couplet from Pope is as follows:

To balance fortune by a just expense,
Join with economy—magnificence.

Shakespeare declared "Thrift is blessing," and again he said, "I can get no remedy against this consumption of the purse; borrowing only lingers and lingers it out; but the disease is incurable." One of the very best definitions of thrift was given by John Wesley who said "Make all you can, save all you can, give all you can." One of the chief exponents of thrift was Benjamin Franklin, who through the plain philosophy of "Poor Richard" gave counsel on the value of thrift that will doubtless live as long as American literature is extant.

Simon W. Straus, New York and Chicago banker, president of the American Society for Thrift and organizer for the modern thrift movement in America, defined this virtue as follows:

Money saving is not the sum total of Thrift. It is only one of the stones in the building of character. Thrift means much more than the saving of money. There is Thrift of character; Thrift of Time; Thrift of Health and Moral Thrift.

A man is not thriftless who spends money, providing he can afford what he spends, and does his duty otherwise to humanity and society. A miser is an undesirable citizen and just as much a menace to humanity as a spendthrift.

Thrift is submission to discipline, self-imposed. Thrift is denying one's self present pleasures for future gain. Thrift is the exercise of the will, the development of moral stamina, the steadfast refusal to yield to temptation.

Money saving is only a function; it is thrift in its most elemental sense. But the thrift I preach is thrift in all things, and this is the thrift I hope will be taught in the schools of America. For this is the thrift that will give our beloved nation

the type of citizens she will need. From an economic standpoint, thrift is a national necessity.

Andrew Carnegie has emphasized the value of thrift in the following epigram: "The first thing that a man should learn to do is to save his money." From Lord Rosebery we learn that "Thrift is the surest and strongest foundation of an empire, so sure, so strong, and so necessary that no great empire can long exist that disregards it." To the same statesman we are indebted also for the following excellent, comprehensive definition:

> Whatever thrift is, it is not avarice. Avarice is not generosity—and, after all, it is the thrifty people who are generous. All true generosity can only proceed from thrift, because it is not generosity to give money which does not belong to you, as is the case with the unthrifty, and I venture to say that all the great philanthropists—all the great financial benefactors of their species, of whom we have any record, the most generous of all must have been thrifty men.

President Woodrow Wilson's idea of thrift is given as follows:

> If a man does not provide for his children; if he does not provide for all who are dependent upon him—and if he has not that vision of conditions to come, and that care for the days that have not yet gone, which we sum up in the whole idea of thrift and savings, then he has not opened his eyes to any adequate conception of human life. We are in this world not to provide for ourselves alone but for others, and that is the basis of economy—so that thrift and economy, and everything which ministers to thrift and economy, supply the foundations of national life.

In America, there has been for some time a popular misconception of thrift as applied to the individual. To be thrifty meant, in the minds of many, to be greedy, avaricious, miserly. However, as a result of the work of the American Society for Thrift, organized in 1913 by Simon W. Straus, a truer understanding of thrift became general. Organization of the society followed investigations made in several European countries by Mr. Straus, who received a commission from the United States government through the Bureau of Education to conduct these economic researches.

In the European countries visited, he found that thrift was the safeguard of the individual. In the face of a low earning capacity, even among the most poorly paid classes, thrift was practiced and money was saved, thus assuring the individual an income during the periods of unemployment, sickness and old age; and in the aggregate adding greatly to the potential power of a nation. These conditions contrasted sharply with the profligate ways of the prosperous American, and Mr. Straus, on his return from Europe, began at once the organization of the American Society for Thrift, which collected no funds and had for its purpose a purely educational propaganda.

In 1915, Mr. Straus was invited by the Panama-Pacific Exposition to preside at an International Congress of Thrift, to be held on the Exposition grounds. At this congress it was decided that the teaching of thrift in the public schools in the United States would lay a foundation for the practice of this virtue by future generations. A committee was appointed to wait on the National Education Association then holding its annual meeting in Oakland, Cal., and asked the coöperation of that body. The National Education Association took up the movement and delegated the National Council of Education, a subsidiary body, to prosecute the work. A committee, consisting of members of the National Education Association and the American Society for Thrift, was appointed as the Thrift Educational Committee, and they spent two years in research and investigation.

During the school years 1915-1916-1917 the National Education Association also held essay-writing contests on the subject of thrift in which cash prizes and medals were awarded. Over 150,000 American school children wrote essays in these contests. In the school year 1916-1917 an essay contest on thrift was inaugurated by the board of education of New York City, and over 400,000 pupils in the elementary grades of the schools of the American metropolis participated for cash prizes aggregating $1,000. These contests were held under the auspices of the American Society for Thrift.

The Thrift Educational Committee made a report to the effect that thrift, as a distinct and concrete branch of studies, could not be introduced into the already overcrowded curricula of the American schools, but that through correlation of those subjects which should exist as the basis of every good curriculum, it could be worked out. This resolution definitely committing the official school governing body of America to the policy of revising the curricula sufficient to include a thrift application to many branches, was introduced at the meeting of the National Council of Education in Portland, Oregon, July 7, 1917, by Simon W. Straus, president of the American Society for Thrift. Having thus committed themselves to this policy, the school authorities, through a subcommittee, appointed at their Portland meet-

ing, began at once to work out concrete courses of study. While the courses of study will vary with the various grades, the following summary may be taken as the basis upon which the science of thrift instruction is based:

Arithmetic. In the primary grades, problems are given the children for solution which show the value of saving; also the necessity of accuracy which implies truthfulness. In the intermediary grades the element of compensation and reward is introduced into the problems, while in the advanced grades, the value of investment is shown. A thrift application must be given to the entire range of mathematical studies, including bookkeeping, accounting and commercial practices.

English. This branch furnishes opportunities for the teaching of thrift to the children by means of story-telling, compositions and essays which include the memorizing of such fables as *The Farmer and the Wheat, The Ant and the Grasshopper*, etc. Stories and compositions on the life and works of the industrious insects and animals will show the value of coöperative and individual industry. The specific writing of essays on the subject of thrift will lead the children to research and thought on this subject without losing any value in diction, grammar or rhetoric.

Geography. The value of conservation can be taught in connection with this branch. The study of unused lands and wasted waterpower suggests the necessity of conservation. This also brings in gardening and forestry. The topography of a locality suggests the comparative value of industries and occupations. Domestic and foreign commerce as well as transportation and trade routes are rich in suggestion of the principle of thrift.

History and Civics. The value of coöperation may be taught through these branches, also through biography. The child may learn that the most successful careers were built primarily on habits of thrift. The lives of successful men, particularly those who have contributed to the substantial upbuilding of America, may be studied with interest and profit. A study of the decline and fall of nations brought about through the improvidence of their people, and a study of the healthful growth of those nations whose people are thrifty, may all be included.

Hygiene. This study suggests cleanliness, sanitation, care of the teeth, home ventilation, proper breathing, abundant use of pure water, care of the sick, emergencies, danger of narcotics. This study should bring out the actual loss incurred through ill health and unhealthful practices.

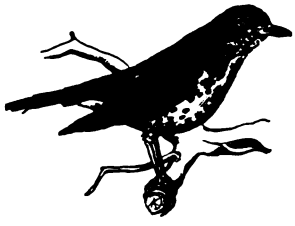
Domestic Science includes a study of the chemistry of foods, food selection, economic preparation of food, marketing, gardening and the preservation of food. It also includes sewing, which means the proper selection of fabrics and the saving of clothing through mending, darning and repairing.

It is suggested that in communities where thrift is not taught in the schools, parents may adopt plans by which a portion or all of this outline may be given to the child through home instructions.

To the individual wishing to take up practices of thrift, it is suggested that a definite record be kept of every penny earned and every penny spent. At the end of the month, go over these items and prepare a budget for the succeeding month which will, if possible, include the elimination of such expenditures as are considered unnecessary or wasteful. Make it a definite point also to save systematically; lay aside from your earnings a fixed sum daily, weekly or monthly. Make the amount small enough so that there will not be grave danger of becoming disheartened. It will be found that the saving habit becomes a most fascinating one after one has begun it. S.W.S.

Consult Smiles' *Thrift.*

THRUSH, a group of song birds found all over the world. There are about 240 species, including numerous plain brown birds, with whitish and usually spotted breasts, besides the robins, wheatears and bluebirds. Thrushes are migratory. They inhabit wooded regions, spending much time on the ground and feeding almost entirely upon insects, thus proving themselves of value to man. They are the highest order of songsters.



O thrush, your song is passing sweet,
But never a song that you have sung
Is half so sweet as thrushes sang
When my dear love and I were young.
—MORRIS: *Other Days.*

The largest and best known North American species, barring the American robin, is the *wood thrush,* which has bright cinnamon upper parts, and conspicuously spotted breast and sides. It is noted for its clear, flutelike song. The wood thrush nests in the Northern United States and winters in Central America. Its nest, built on the horizontal branch of a bush or tree, consists of leaves, twigs, etc., closely woven together and having an inner wall of mud and a lining of fine rootlets. The eggs are three to five in number and of a greenish-blue color. Other common species are the *Wilson's thrush,* or *veery,* the *hermit thrush* and the *bluebird.* In England, the commonest thrushes are the *redbreast,* or *English robin,* the *throstle,* or *song thrush,* and the *nightingale,* the sweetest singer of all the thrushes.

Consult Forbush's *Useful Birds and Their Protection.*

THUCYDIDES, *thu sid'i deez,* a Greek historian of the fifth century B.C., celebrated as the first historian to write from a critical standpoint. His great masterpiece, *A History of the Peloponnesian War,* is divided into eight books, the last of which concludes abruptly and bears evidence of not having been carefully revised. The narrative covers twenty-one of the twenty-eight years of the war, the period from 431 to the middle of 411 B.C. It is a terse, impartial record of the conflict, and a striking testimony to the author's painstaking efforts to obtain and present accurate information. As the events are given according to the record of each summer and winter, they are not always properly grouped, but on the whole the history is one of the best available sources of information on that period. The author is admired, too, for his skill in analyzing characters and his ability to show the relation between cause and effect.

THUCYDIDES

Thucydides was born in Attica. He came of an aristocratic and wealthy family, and was the possessor of rich Thracian gold mines. During the Peloponnesian War, in 424 B.C., he was in command of part of the Athenian fleet, but his failure to relieve the siege of Amphipolis made him an exile for twenty years. He returned to Athens in 403 B.C., shortly after the close of the war, and it is supposed that he died two or three years later.

THUGS, the name commonly applied in America to "holdup" men or highwaymen. The word is from the Hindustani *thag,* meaning a *cheat* or *rascal,* and was first applied to a religious society in India whose members committed murders and plundered victims in honor of Kali, the patron goddess of the thugs. According to legend they formerly believed that Kali assisted them in disposing of the bodies of their victims by devouring them, but when one of the fraternity became curious and pried into the proceedings of the goddess she became angry and condemned them in the future to bury their victims. The native Indian and the English governments have tried to suppress thuggee—the practice of the thugs—at various periods, and in 1831 the British authorities adopted strenuous measures to put an end to the evil. It is now practically wiped out.

THULE, *thu'le,* or, more commonly, ULTIMA THULE, the name usually given in ancient literature to the most northern of lands. Some writers say that Iceland was meant, others that the name was given to one of the Shetland Islands.

THURS'DAY, the fifth day of the week, literally *Thor's day,* sacred to the ancient Scandinavian or Teutonic god of thunder. This is probably a translation of the Latin *dies jovis,* meaning *Jove's day,* Jove or Jupiter being the corresponding Roman god. In the United States the last Thursday in November is celebrated as Thanksgiving Day. Maundy Thursday, also called Holy Thursday, is the day preceding Good Friday. See THOR.

THWAITES, *thwayts,* REUBEN GOLD (1853-1913), an American historian, born at Dorchester, Mass. He attended the high school, but his college work, in preparation for a post-graduate course at Yale, he did by himself. In 1866 he went to Wisconsin, and ten years later was made managing editor of the *Wisconsin State Journal,* at Madison. From 1886 until his death he was secretary and superintendent of the State Historical Society of Wisconsin, and editor of its publications. Among his published volumes are *Down Historic Waterways; The Story of Wisconsin; The Colonies, 1492-1750; On the Storied Ohio; Stories of the Badger State* and biographies of Daniel Boone, Marquette and George Rogers Clark. Besides his part in making the Wisconsin State Historical Society efficient beyond those of many other states, his greatest work was the editing of the seventy-three volumes of *Jesuit Relations.* This is considered by authorities one of the most excellent examples of scholarship ever shown by an American historian.

THYME, *time,* a fragrant garden herb belonging to the same family as the mints. Its scent is due to an oil contained in the leaves and stems, from which is prepared the drug thymol. In Europe thyme is cultivated for use as a flavoring. The plant grows from six to ten inches high, and has square, hairy stems, narrow leaves and small lilac or purplish flowers, borne in separate whorls. A variety known as *creeping thyme,* with woody, branching stems, makes an admirable cover for rocks and waste places. There is an old tradition that at midnight in midsummer the king of the fairies and

his followers frolic in beds of wild thyme. Oberon, king of the fairies in Shakespeare's *Midsummer Night's Dream,* says:

> I know a bank whereon the wild thyme blows,
> Where ox-lips and the nodding violet grows.

TIAN-SHAN, *te ahn' shahn',* **MOUNTAINS,** an extensive mountain system of Central Asia, commencing in Russian Turkestan and extending nearly 1,500 miles in an easterly direction to the Desert of Gobi. It is closely connected with the Atlas system and forms the great barrier which divides the watersheds of Balkash and Dzungaria. The system consists of a series of ranges running parallel to each other, with a breadth of about 200 miles. The highest peak is Khan-Tengri, rising 2,400 feet above sea level. To the westward of Khan-Tengri the Tian-Shan range divides into several portions, one of which extends through the Pamir and joins the Hindu Kush and the Himalayas.

There are numerous roads and passes over the mountains, connecting China, West Turkestan and Persia. These routes are extremely dangerous in winter, owing to the vast accumulation of snow. In this region the snow line is from 11,500 to 12,500 feet above sea level; all peaks above that height are snow clad, and have numerous glaciers many miles in extent. The mountains contain vast mineral wealth almost entirely undeveloped.

TI'BER, the historic stream on which lies the city of Rome, called in ancient writings "Father Tiber" and the "Yellow Tiber." The former name suggests the affection with which the Romans regarded it; the latter refers to the color of the water, whose swift current carries down stream great quantities of sand and mud. This sediment, deposited century after century at the mouth of the river, has built up the land until at the present time the harbor is four miles farther out than in the days of ancient Rome.

The Tiber is the second largest river of Italy, ranking next to the Po. It rises in Tuscany, in the Apennines, and after a winding course of 245 miles empties into the Tyrrhenian Sea (an arm of the Mediterranean) about twenty-six miles below Rome. It enters the sea by two branches, one of which is a channel excavated by the emperors Claudius and Trajan. These two arms surround an unhealthful island known as the Isola Sacra. The Tiber in times past has frequently overflowed its banks and caused great devastation, and costly embankments constructed at Rome have only partially averted this peril. In 1900 one of the most disastrous floods in its history occurred. Under normal conditions the river is navigable for small steamers as far as Rome.

TIBERIUS, *ti be'ri us* [TIBERIUS CLAUDIUS NERO CAESAR] (42 B. C.-A. D. 37), the second Roman emperor, the son of Tiberius Claudius Nero, an officer under Julius Caesar, and Livia, who afterwards was the wife of Augustus. His mother used her powerful influence to secure the advancement of Tiberius and his younger brother Drusus, and the former won considerable distinction in the army, carrying on successful campaigns in Germany and Gaul. Tiberius was compelled by Augustus to divorce his wife, Vipsania Agrippina, to whom he was devoted, and to marry Julia, the emperor's daughter. For a time after this he lived in seclusion at Rhodes, but he returned in A. D. 1 and again took charge of the army. Although he had no affection for Tiberius and felt little confidence in him, Augustus adopted him and designated him as his successor, and in A. D. 14 Tiberius came to the throne.

TIBERIUS
From a bust in the Museo Nazionale, Naples.
Augustus, lacking a male heir, first adopted his younger stepson, Drusus, who died 9 B. C., owing to a fall from his horse. In A. D. 4 he adopted Tiberius, and was succeeded by him as emperor in A. D. 14.

Like so many of his successors, Tiberius at first governed well, and throughout his reign all the provinces of the empire were especially prosperous. In Rome, however, he showed a growing suspiciousness and cruelty. Spies were stationed everywhere to report any opposition to the emperor, and all who were even under suspicion were punished with death. Postumus Agrippa, grandson of Augustus; Germanicus Caesar, the popular nephew of Tiberius; Tiberius' own son, Drusus Caesar—all were put to death because the emperor feared them; and his own death at Capri at the hands of Macro was but the final act of violence of the reign.

Tiberius was a man of undoubted genius, clear of judgment, tenacious of purpose; but he was cold, unloving and fond of shrouding all his acts in mystery. Thus he became hated

by the people, and the accounts of him which remain are doubtless darker than his real character would warrant.

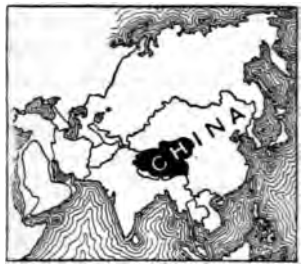
Named in the Bible. Tiberius is mentioned once in the Bible, and the fact serves as a connecting link between so-called scripture and profane history of the period. In the gospel of *Luke* III, 1-3 is the statement that in the fifteenth year of Tiberius the word of God came to John the Baptist. It is known from other sources that John was then about thirty years old and that Jesus was only six months younger; this mention therefore serves as important data for determining the time of the birth of Christ. A.MC C.

For the part played by Tiberius in the line of emperors, see ROME, subhead *History*.

TIBET, *ti bet'*, a great expanse of country nominally a part of China, but in reality possessing almost an independent government. It has been aptly called "the roof of the world," for it is the most elevated large area on the globe; the whole country is a plateau, broken by a few river valleys near its borders. It is as large as that part of the United States east of the Mississippi River and north of Tennessee; however, because of physical conditions the country contains fewer inhabitants than the single state of Massachusetts.

The map opposite page 416 in these volumes tells at a glance something of the story of Tibet. At the south the Himalaya Mountains send heavenward the tallest peaks in the world; the Brahmaputra River, in Tibet called the Tsanpo, has to flow over a thousand miles eastward and around them to find its Indian outlet to the sea. On the north and northwest the Kuen-lun range sends some of its peaks to a height of 20,000 feet. Enclosed thus on three sides by towering walls, the surface of Tibet has an average elevation of fully 12,000 feet; the lowest, in the east, is 9,000 feet, and the highest, in the southern part, about 17,000 feet. In the west the altitude is 12,000 to 14,000 feet.

The People. The facts related above explain in large measure why Tibet contains so few people. When it is further stated that the mountains limit the rainfall to a very few inches a year and that thousands of square miles are a dreary expanse of sand and gravel, over which violent winds blow at all seasons, it is difficult to understand how even three and a half million people can live there. Two-thirds of the people live in the southern part, in the Brahmaputra valley, with the frowning Himalayas at their back; most of the others live in the northeast, near the great lake of Kuku-Nor, which is elevated a mile and two-thirds above the sea. There are hundreds of other lakes, but they are in dreary surroundings, and most of them are salty, because of absence of rain.



LOCATION MAP
Tibet comprises a large but comparatively unimportant part of China.

The people have not been greatly influenced by their surroundings, for they are cheerful, and strangers find them friendly. They smile and stick out their tongues when they meet, for that is their cordial salutation. Cloth is hard to get, but as the climate is cold—freezing weather occurs even in midsummer—they dress comfortably in sheepskin, although one cloth garment, a great woolen coat, is much worn. Nearly all the cloth is homespun.

Their Religion. Tibetans are very religious, and this may partially explain their contentment. They profess Lamaism, an offshoot of the Buddhist faith. Raising large families and increasing the number of households is a serious matter because of the difficulty of making a living, so thousands of young men and women become monks and nuns. The monks are called *lamas*, and Tibet holds half a million of them. These lamas dress in long robes of yellow or purple. Among the people who marry the system called polyandry exists; one woman will often marry from two to half a dozen men—usually all the brothers of one family. The people live in rude houses of mud and stone.

Resources. It is possible to live but a few months of the year in the high altitudes; while there the people raise sheep and yaks, and these they drive lower down when the short warm season is over. In the valleys there is vegetation, but it is not plentiful enough to meet the demands of the population. Barley is the staple crop, for it will grow in cooler climates than any other grain except rye, and it is the principal foodstuff. There is some mining, gold, silver, iron and copper being found.

Government. Because it is inaccessible, Tibet is difficult to govern from Peking. The authority of China is felt but slightly in the province, and the people appear to care little what happens to the remainder of the republic; in-

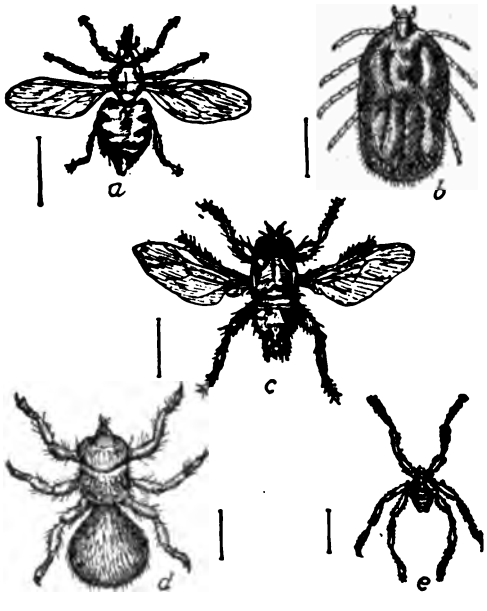
deed, they have declared their desire to be independent. They live largely unto themselves. The local authority is the *dalai lama,* a term which means *grand lama;* he rules from the capital, Lhasa, known to the outside world as the "Forbidden City," because to its most sacred precincts white people are not permitted to penetrate. E.D.F.

Consult Holdich's *Tibet the Mysterious;* Hedin's *Adventures in Tibet.*

Related Subjects. In connection with this article the reader may refer to these topics:

Brahmaputra	Kuen-lun Mountains
Himalaya	Lamaism

TIC DOULOUREUX, *tik doo loo roo',* a French expression meaning *painful twitching,* is the name of an acute form of facial neuralgia, often brought on by a diseased tooth, cold, or nerve inflammation or degeneration. There are usually shooting pains on one side of the face, which often recur every day at the same hour. Warm applications or electrical treatment with iodides will sometimes relieve the pain; but it may be necessary to remove a part of the nerve. See NEURALGIA.



TICKS

The illustrations show ticks found on (*a*) birds; (*b*) cattle; (*c*) horse; (*d*) sheep; (*e*) bat. The perpendicular lines indicate actual adult sizes. All except *b* are shown in their immature stage, when they have but six legs.

TICK, the popular name of several varieties of tiny eight-legged parasites which attack mammals and birds. The head, chest and abdomen are all in one, and the mature insect is oval, with a flat back and leathery covering. Although found in plants when young, the large ticks attach themselves by their mouths to the soft flesh of mammals and birds, and they live on the blood of their victims, growing large, round and red. Only the females, so far as zoölogists know, suck the blood. The only thing which can be said in their favor is that one species eats grasshoppers' eggs. One of the eight species of cattle ticks occurring in America is responsible for Texas cattle fever, and all spread disease. A Persian variety, which attacks men at night, is said to cause death by its bite. Ticks belong to the same class as mites, scorpions and spiders (see ARACHNIDA).

TICONDEROGA, *ti kon der o' ga,* BATTLES OF. Ticonderoga, a village in Essex County, N. Y., is historically important as a battle ground in

RUINS OF OLD TICONDEROGA

three wars. It is situated in an agricultural and rich graphite region, between lakes Champlain and George, 100 miles northeast of Albany. In 1910 it had a population of 2,475. In 1915 the population was 2,918 (state census).

The first battle in the vicinity was fought in 1609, when Samuel Champlain, the French explorer of Quebec, won a victory over the Mohawk Indians. After the outbreak of the French and Indian War, in 1755, the French built a fort near the village, which was attacked in July, 1758, by the British under General Abercrombie. In 1759 the fort was besieged and captured by a British force under General Amherst. One of the first movements in the Revolutionary War was the dispatch of an American expedition against Ticonderoga, and on May 10, 1775, the fortress was captured by Ethan Allen without the loss of a man. When the British commander demanded of Allen by what authority he claimed its surrender, he uttered the now famous reply, "In the name of the Great Jehovah and the Continental Congress." The fort was retaken by Burgoyne's forces in